

# F4F Wildcat

in action



*Don Greer*

Aircraft Number 191  
squadron/signal publications

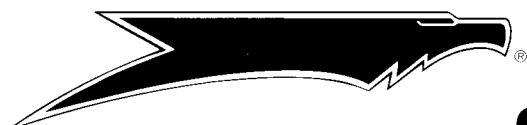
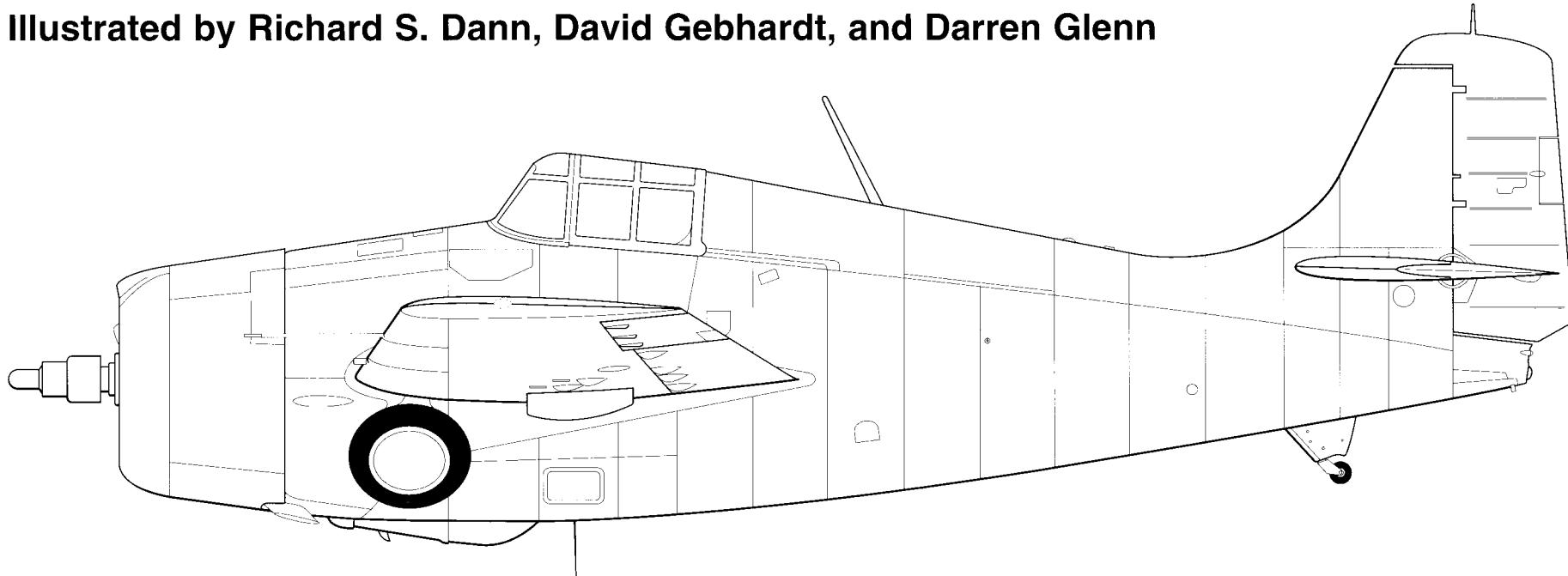
# F4F Wildcat

## in action

By Richard S. Dann

Color by Don Greer and Richard S. Dann

Illustrated by Richard S. Dann, David Gebhardt, and Darren Glenn



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**CAPT Marion E. Carl flies his F4F-4 Wildcat (13, BuNo 02100) against a Japanese A6M2 Zero over Guadalcanal on 26 August 1942. The Zero jumped Carl while he was in the landing pattern at Henderson Field, but Carl retracted his landing gear and shot down the Japanese fighter. He was assigned to Marine Fighter Squadron Two Twenty Three (VMF-223) on Guadalcanal.**

## Acknowledgements

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Shelley Hofmann

## Dedication:

This book is dedicated to the memory of Mr. Roger Seybel and to all the great volunteers at the Northrop Grumman History Center in Bethpage, New York. This dedicated bunch volunteers their valuable time each week to keep this facility running. I visited the center in November 2001 and was able to look through the files on hand. I would personally like to thank the following volunteers:

Larry Fellieu

Lynn McDonald

Robert Tallman

Roger Seybel

This new edition of 'Wildcat in Action' strives to shed light on some of the murky details of the Wildcat design. During my research, I was able to obtain drawings of the wing configurations of almost every Wildcat version. Additionally, I was able to uncover details about the F4F-7, one of the lesser-known variants of this fine aircraft.

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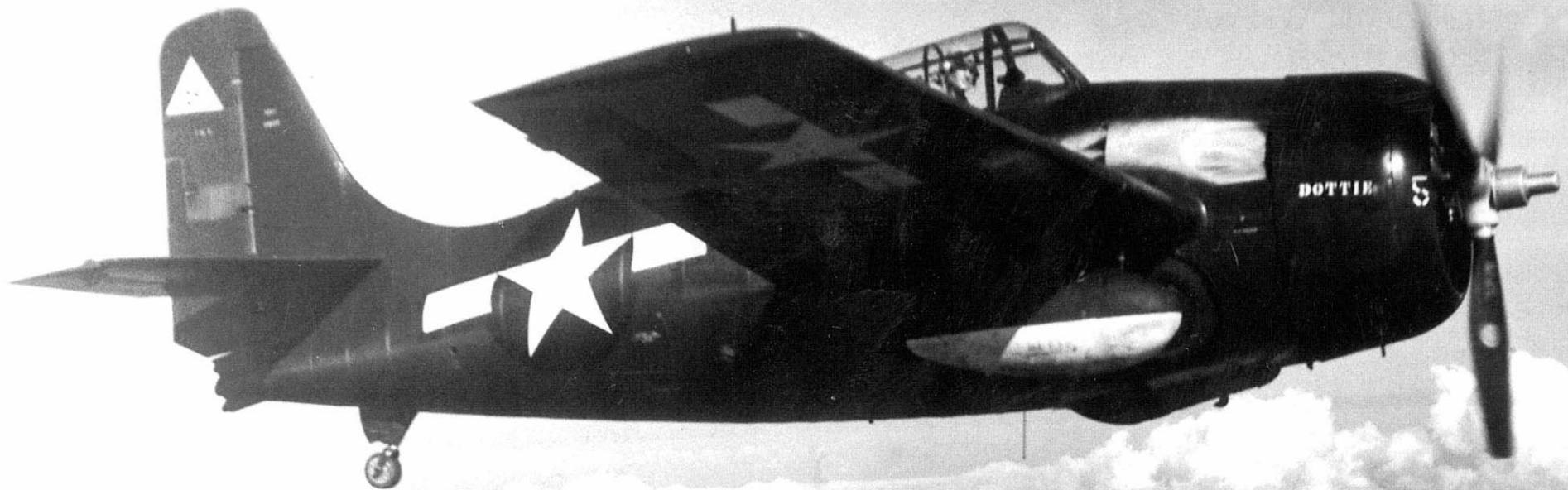
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Three FM-2 Wildcats of Composite Squadron Four (VC-4) fly over the Pacific. VC-4 was embarked aboard the escort carrier USS WHITE PLAINS (CVE-66) in 1945. The nearest aircraft (5) is named DOTTIE. There are unusual combinations of colors on the 58-gallon (220 L) drop tanks. The overall aircraft color is Glossy Dark Sea Blue (FS15042), while the national insignias feature a Glossy Insignia Blue (FS15044) surround to the Glossy Insignia White (FS17875) star and bars. (PHCS Mahlon Miller via NHC)



# Introduction

Aeronautical development was accelerating at an amazing pace by 1935. In the early 1930s, carrier-based (and land-based) military aircraft were built using essentially the same construction techniques used during World War One. By mid-decade, stressed skin monoplanes with phenomenal performance characteristics – including Great Britain's Supermarine Spitfire and Germany's Messerschmitt Bf 109 – were in advanced stages of development.

Grumman Aircraft Engineering Corporation of Bethpage, Long Island, New York was still a relatively new company in 1935. Leroy Grumman, 'Jake' Swirbul, and William Schwendler founded the company in the midst of the Great Depression in December of 1929. Grumman began its existence by manufacturing aircraft floats for the Vought O3U observation aircraft, and aluminum truck bodies. Expressing a desire to become an airframe manufacturer, Grumman submitted a bid in the US Navy's High-Speed Two-Seat Fighter (HSTF) competition in early 1930. This competition resulted in a contract for 27 of Grumman's G-5 design, or FF-1. This advanced aircraft and its derivatives introduced Naval Aviation to metal aircraft construction, retractable landing gear, and enclosed cockpits. Following the FF-1's success, Grumman set about designing a follow-on fighter, this time in a single seat configuration. The result was the F2F-1, which became the Navy's premier fighter aircraft during the mid-1930s. By 1935, Grumman was already hard at work designing the F2F-1's eventual successor, the F3F. The F3F was built in three major sub-variants between 1935 and 1938. By 1938, all US Navy (USN) and Marine Corps front-line fighter squadrons were equipped with Grumman's F2F-1 and all F3F variants.

In November of 1935, the Navy was already looking for the eventual successor to the F3F series and released a request for proposals for a new carrier-based fighter. Development con-

**Grumman's first successful aircraft design was the FF-1. It was the first US Navy carrier aircraft built with all-aluminum construction, retractable landing gear, and enclosed cockpits. A Fighting Squadron Five (VF-5) FF-1 (5-F-13, BuNo 9363) recovers aboard the carrier USS LEXINGTON (CV-2) in 1934. (Northrop Grumman)**



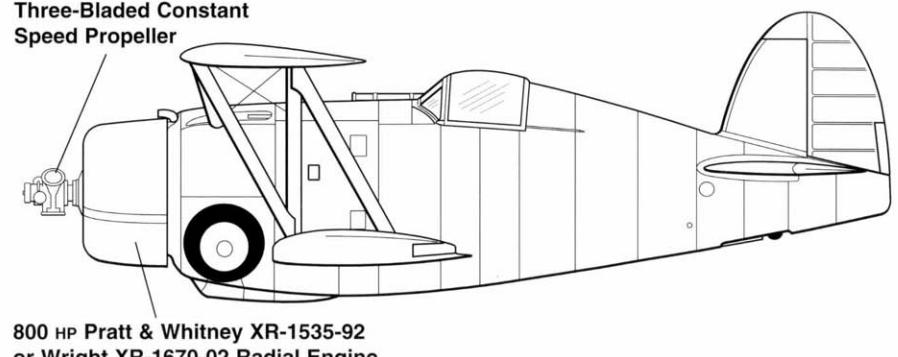
**The F3F-3 was the final variant of the highly successful F3F series. This aircraft (BuNo 1463) was the last of 27 F3F-3s built. It was never delivered to a fleet squadron; however, it and BuNo 1462 were used for testing at NAS Anacostia, District of Columbia. Construction techniques used on the later Wildcat are evident in this F3F. (NMNA)**

tracts were awarded to Grumman and Brewster. Grumman's submission came in the form of the **G-16** (USN designation **XF4F-1**), a biplane with calculated performance on par with the F3F-2, then in advanced development. Another relatively new aircraft manufacturer, the Brewster Aircraft Corporation of Long Island, submitted their B-139 design (Navy designation **XF2A-1**). The XF2A-1 was an all-metal monoplane with calculated performance figures much better than the G-16. In late July of 1936, at the manufacturer's suggestion, the Navy asked Grumman to terminate work on the XF4F-1.

All was not lost for Grumman, due to an amendment on the XF4F-1 contract. The Navy requested one Grumman Design 18 (**G-18**), a proposed single seat monoplane fighter. Work on this prototype, which the Navy designated as the **XF4F-2**, started immediately at Grumman's Farmingdale, New York facility.

## Grumman Design G-16 (XF4F-1)

Three-Bladed Constant Speed Propeller



**800 HP Pratt & Whitney XR-1535-92 or Wright XR-1670-02 Radial Engine**

# XF4F-2

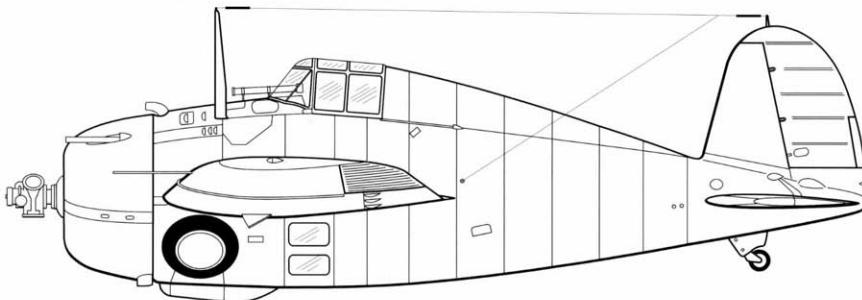
Grumman completed construction of the XF4F-2 (BuNo 0383) in September of 1937. The XF4F-2 was a mid-wing, full cantilever, all metal design of semi-monocoque stressed skin aluminum construction. It featured rounded tips on all flying surfaces, an enclosed cockpit, and landing gear that retracted into the fuselage in a manner similar to the F3F. The XF4F-2's overall length was 26 feet 5 inches (8.1 m) and the wingspan was 34 feet (10.4 m). Its empty weight was 4035 pounds (1830 KG) and the gross weight was 5386 pounds (2443 KG).

A 1050 HP Pratt & Whitney R-1830-66 14-cylinder, air-cooled, radial engine powered the XF4F-2. The R-1830-66 had a single-stage, single-speed supercharger. This powerplant turned a 10-foot (3 m) diameter Hamilton Standard constant speed three-bladed metal propeller. The XF4F-2's estimated top speed was 290 MPH (467 KMH). Its armament consisted of two fuselage mounted .30 caliber (7.62MM) Browning M2 machine guns firing through the propeller arc, and the capability to carry two additional guns in the wings. Additionally, a Mk XLI bomb rack capable of carrying one 100 pound (45 KG) bomb could be fitted under each wing.

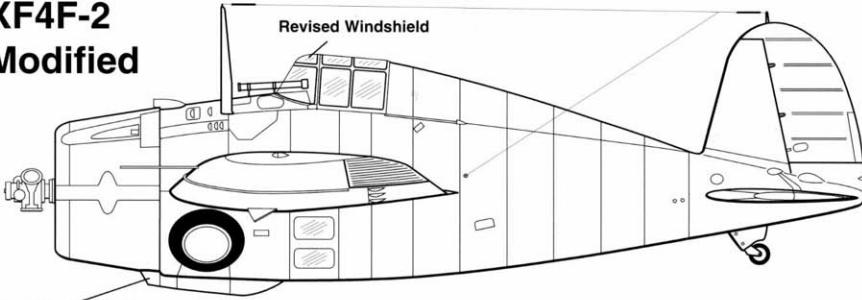
The XF4F-2's first flight occurred on 2 September 1937, with Grumman test pilot Robert Hall at the controls. Following manufacturer's trials, the aircraft was delivered to Naval Air Station (NAS) Anacostia, District of Columbia (DC) for acceptance trials on 23 December. From the outset, the XF4F-2 was plagued with problems, most notably a rash of crankshaft bearing failures. A change in bearing material was found as a solution and testing resumed. While on a test flight on 14 February 1938, BuNo 0383 suffered an in-flight fuselage fire. Test pilot Hall managed to land before a catastrophic failure occurred.

At the end of February of 1938, the XF4F-2 was flown from Dahlgren, Virginia to NAS Anacostia in preparation for more Navy tests. This was followed by a trip to the Naval Aircraft

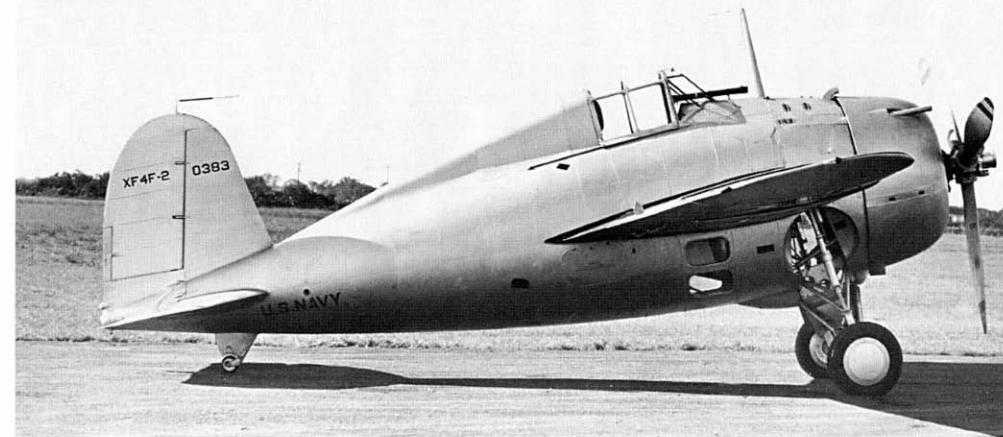
## XF4F-2 Original Configuration



## XF4F-2 Modified



Modified Cowling and Exhaust



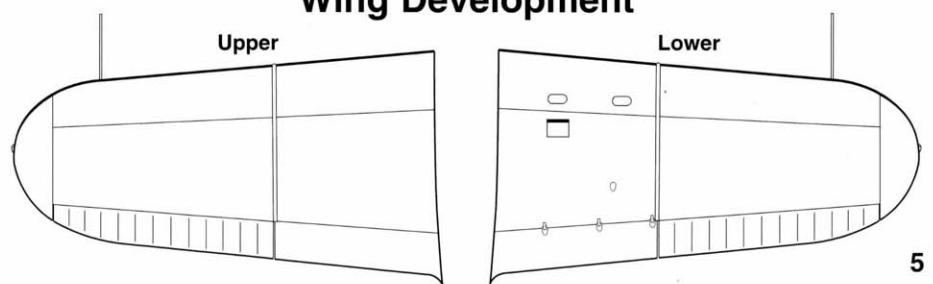
The initial configuration of the XF4F-2 (BuNo 0383) shows the strong family resemblance to Grumman's earlier biplanes. Distinct features of the XF4F-2 in its initial form included long blast tubes for the cowl-mounted machine guns and rounded flying surfaces. The XF4F-2 was powered by a 1050 HP Pratt & Whitney R-1830-66 14-cylinder radial engine. (Northrop Grumman)

Factory in Philadelphia for carrier compatibility trials in early April. It was during this testing that the XF4F-2 suffered a second mishap. While conducting catapult tests on 11 April, the aircraft suffered an in-flight engine failure followed by a forced landing which resulted in the aircraft flipping over on its back, causing major damage. Following this mishap, the aircraft was returned to Grumman in Bethpage for approximately two weeks of rebuilding.

All this testing led up to the selection of the Navy's next-generation fighter aircraft. The competition for the contract consisted of Seversky's NF-1 – a navalized derivative of the P-35 pursuit aircraft then in production for the US Army Air Corps – and Brewster's XF2A-1. The XF4F-2 was the fastest of all three entrants at 290 MPH (467 KMH). The XF2A-1 had a top speed of 280 MPH (451 KMH), while the NF-1 had a top speed of only 250 MPH (402 KMH). In June of 1938, the Navy selected the XF2A-1 as the winner of the competition and awarded Brewster a contract to build 54 production F2A-1s for the USN.

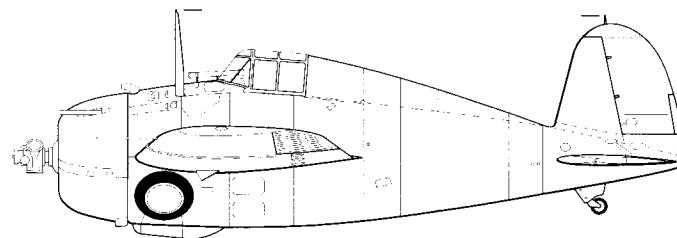
While understandably disappointed with the results of the competition, Grumman felt their design showed much promise, especially by increasing engine horsepower. With this in mind, the Navy awarded Grumman a contract to redesign the XF4F-2. Grumman's design number **G-36** was allocated to this project, which the Navy designated as the **XF4F-3**.

## Wing Development

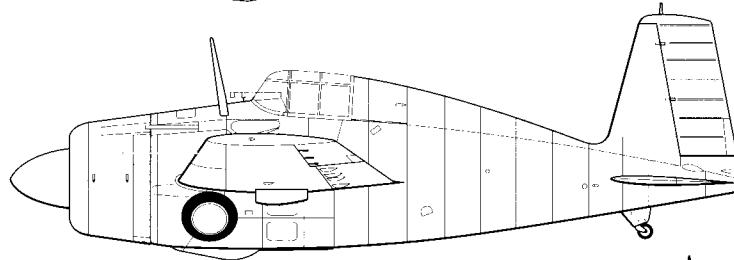


# Development

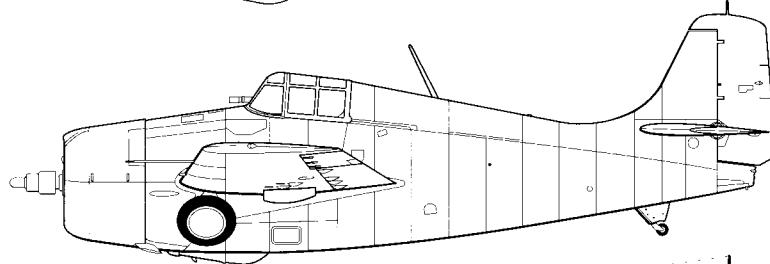
XF4F-2



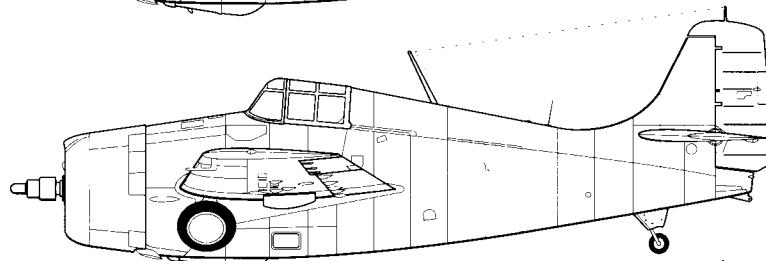
XF4F-3



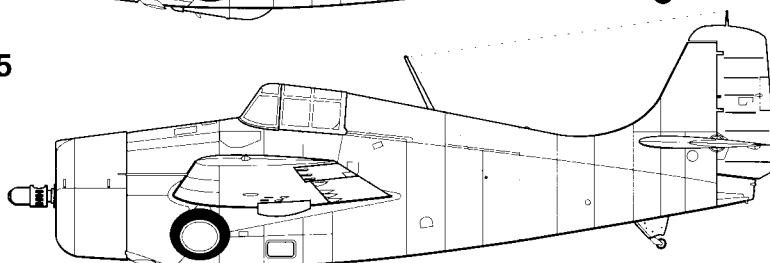
F4F-3



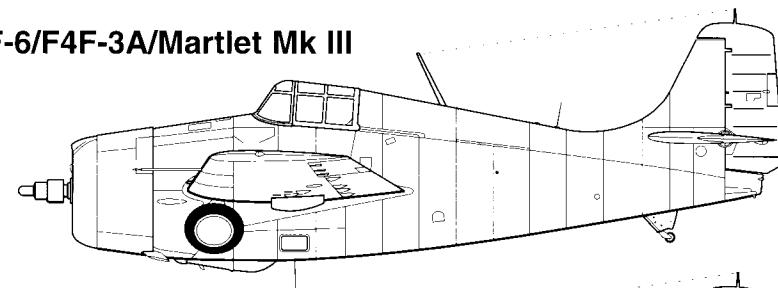
F4F-4



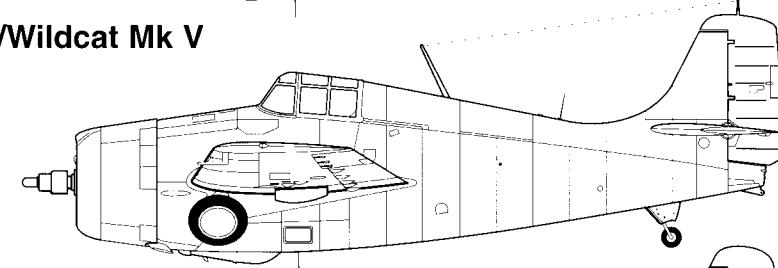
XF4F-5



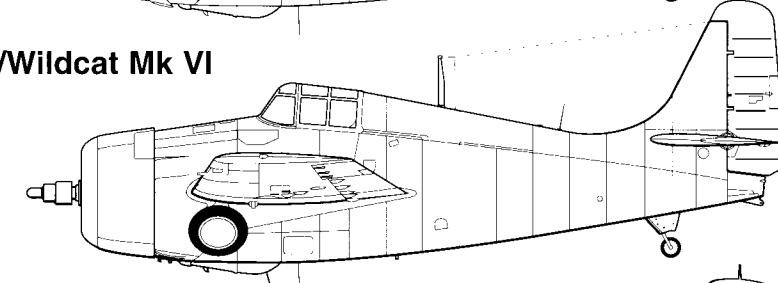
XF4F-6/F4F-3A/Martlet Mk III



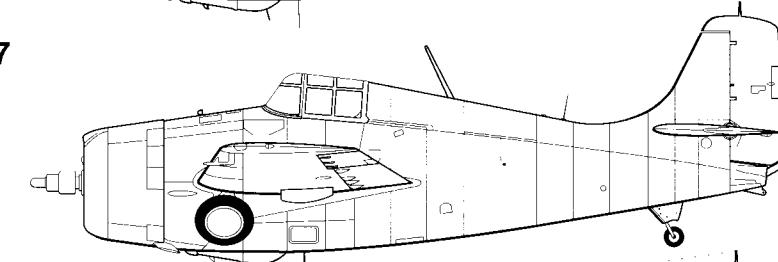
FM-1/Wildcat Mk V



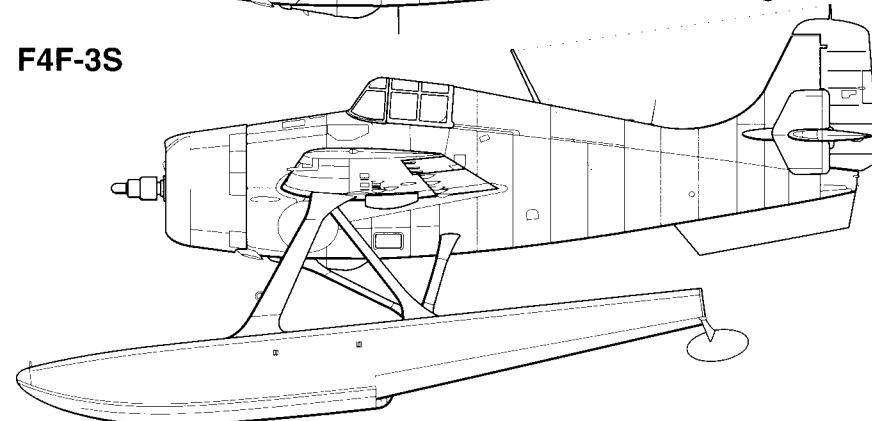
FM-2/Wildcat Mk VI



F4F-7



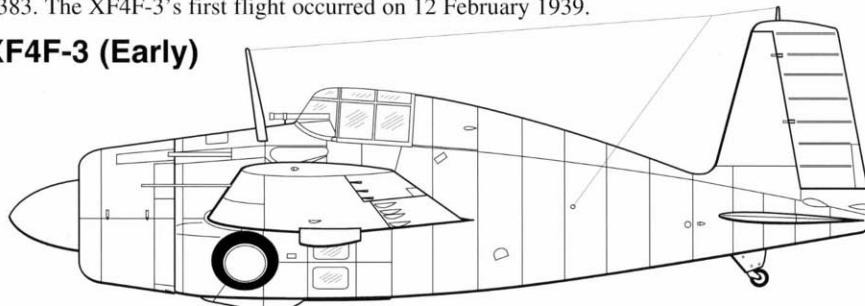
F4F-3S



# XF4F-3

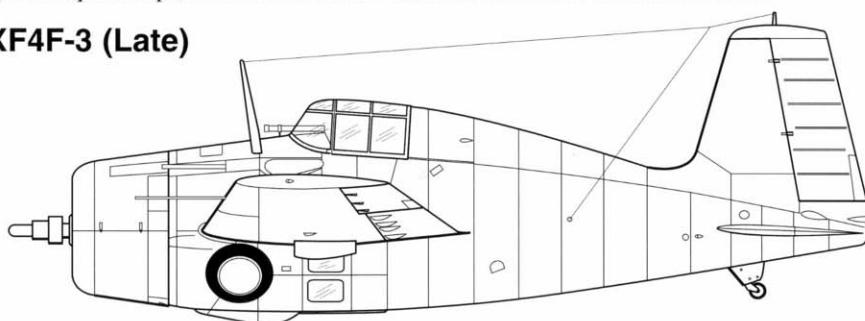
Following the mishap on 11 April 1938, the remains of the XF4F-2 (BuNo 0383) were returned to the Grumman factory. Some parts were used to build a new prototype, this time designated **XF4F-3**. A contract authorizing the production of this aircraft was signed in October of 1938. Interestingly, the aircraft carried the same Bureau Number as its predecessor, 0383. The XF4F-3's first flight occurred on 12 February 1939.

## XF4F-3 (Early)



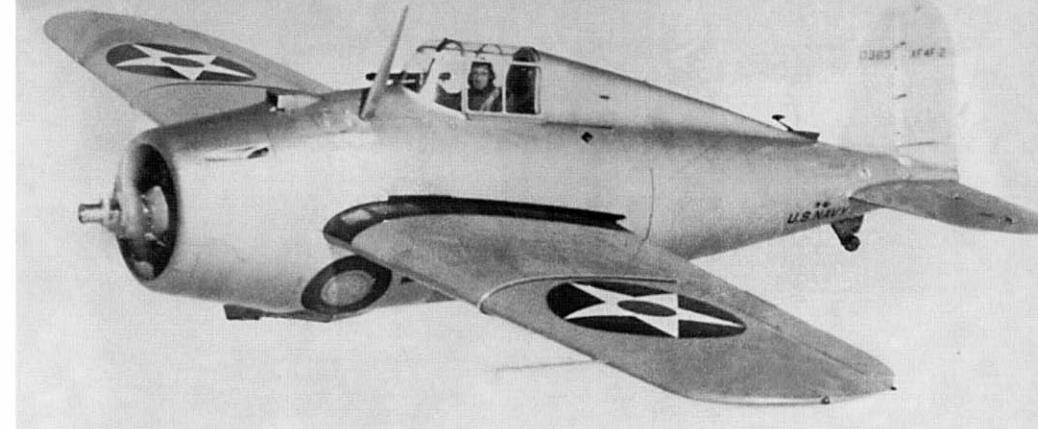
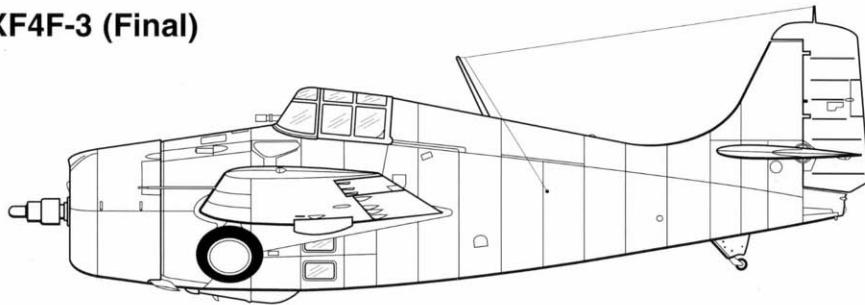
The XF4F-3 differed from the XF4F-2 in many ways. The XF4F-3 was powered by a 1200 hp Pratt & Whitney R-1830-76 radial engine equipped with a two-stage, two-speed supercharger. This engine offered 150 more horsepower than the XF4F-2's R-1830-66. The aircraft was also 19 inches (48.3 cm) longer than the previous model. Additionally, wing dihedral was increased and wingspan went from 34 feet (10.4 m) to 38 feet (11.6 m). All flying surfaces now sported squared tips, which soon became a standard feature of Grumman aircraft.

## XF4F-3 (Late)



Aerodynamic refinements and engine cooling issues required numerous changes to the basic XF4F-3 airframe. Persistent cooling problems with the engine saw several cowling, cowl flap, and propeller spinner variations. Tail surfaces also went under an evolutionary redesign. Following an aerodynamic analysis in the National Advisory Council of Aeronautics (NACA)

## XF4F-3 (Final)

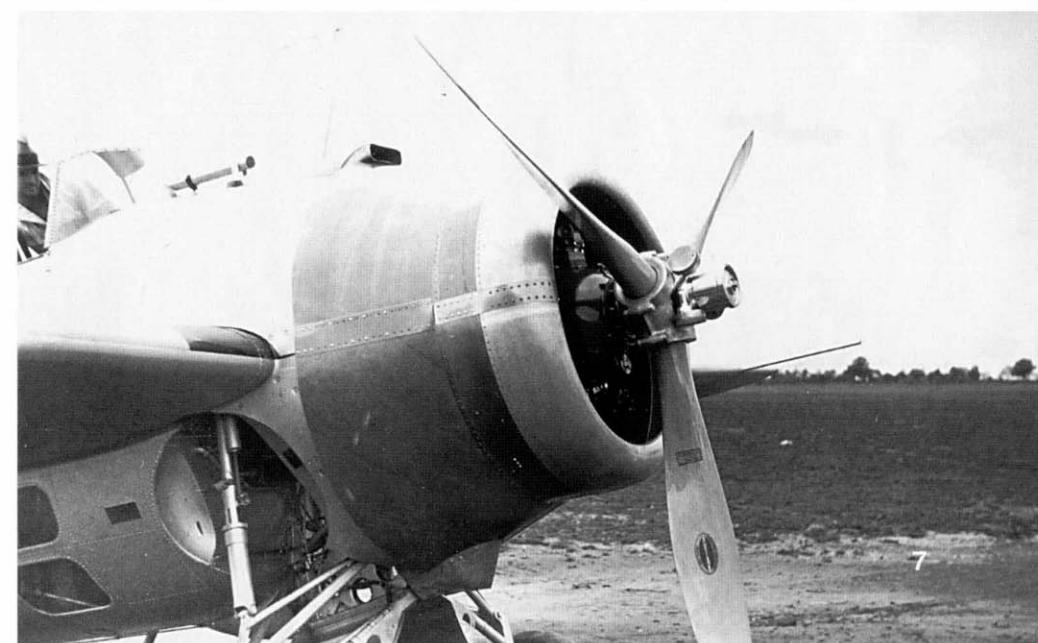


The XF4F-2 (BuNo 0383) in flight. This configuration had a longer-chord cowling and a larger carburetor intake than the initial configuration. The rounded wingtips and external mass balances on the elevators were unique to the prototype. This aircraft was painted overall Aluminum Lacquer (FS17178), with the wing upper surface in Glossy Orange-Yellow (FS13538). (Northrop Grumman)

wind tunnel at Langley, Virginia in late 1939 and early 1940, the final modifications to the XF4F-3 took place. These changes froze the basic design for production **F4F-3s**.

After three years of development, Grumman's persistence with the Wildcat finally paid off. In August of 1939, the Navy placed an order for 54 F4F-3s.

The XF4F-2 was fitted with several different experimental cowling configurations to solve persistent engine cooling problems. The carburetor intake is mounted atop the engine cowling. This configuration was not adopted for production. (Northrop Grumman)





This XF4F-3 (BuNo 0383) was built from the remains of the XF4F-2 after a crash landing on 11 April 1938. The aircraft had flipped over when the main landing gear dug into the soft earth. Changes to the XF4F-3 included lengthening the fuselage, increasing the wingspan, and squaring off the flying surfaces. (NHC)

The XF4F-3 (BuNo 0383) flew for the first time on 12 February 1939. Power was provided by a 1200 HP Pratt & Whitney R-1830-76 engine with a two-stage, two-speed supercharger. This photo was taken following a landing gear collapse on 9 March 1939. (Tailhook)



## F4F-3 Wildcat

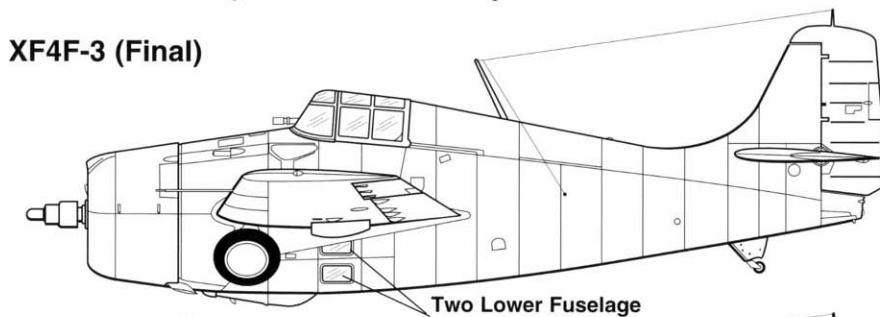
In August of 1939, the United States Navy (USN) placed an order for 54 F4F-3 aircraft. Grumman anticipated the Navy order and began constructing the first two aircraft even before the production contract was signed. The first production F4F-3 (BuNo 1844) flew in February of 1940.

The F4F-3 had a wingspan of 38 feet (11.6 m), a length of 28 feet 9 inches (8.8 m), and a height of 11 feet 4 inches (3.5 m). Its empty weight was 5236 pounds (2375 kg), while its maximum weight was 7065 pounds (3205 kg).

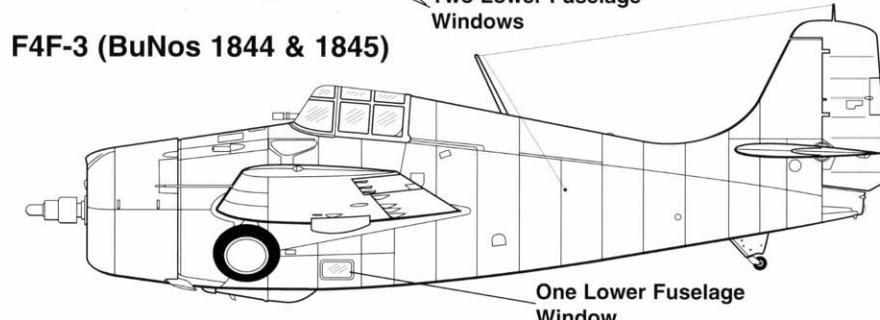
One 1200 HP Pratt & Whitney R-1830-76 or -86 14-cylinder, air-cooled, radial engine turned a three-bladed metal propeller. This engine gave the Wildcat a maximum speed of 331 MPH (533 KMH) at 22,000 feet (6706 M) and a service ceiling of 37,000 feet (11,278 M). Its range on 147 gallons (556 L) of internal fuel was 860 miles (1384 KM).

Following the first flight, Grumman retained 1844 for manufacturer's evaluations before it was sent to Pratt & Whitney's Hartford, Connecticut facility for engine testing. The second F4F-3 (BuNo 1845) conducted its initial flight in July of 1940 and was delivered to NAS Anacostia the following month for Production Inspection Trials. BuNo 1845 was later sent to

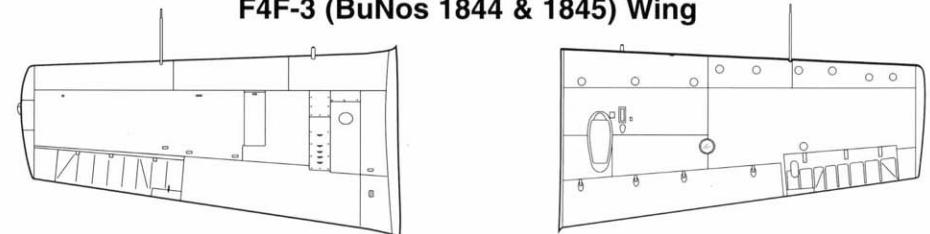
### XF4F-3 (Final)



### F4F-3 (BuNos 1844 & 1845)



### F4F-3 (BuNos 1844 & 1845) Wing



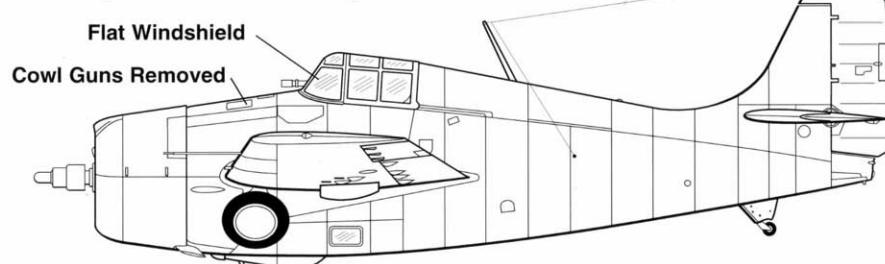
NACA's Langley facility for tests aimed at providing adequate cylinder cooling. Several cowl flap and propeller spinner combinations were tested.

BuNos 1844 and 1845 were not considered representative of production aircraft configuration. Both featured two cowl-mounted .30 caliber (7.62MM) Browning M2 machine guns, which were synchronized to fire through the propeller. Spent shell casings for these guns were ejected through a chute below the wing just forward of the belly window. A bulged fairing on the fuselage access panels was also a distinguishing feature. These two aircraft also featured curved Plexiglas windshields with a telescopic sight protruding through the glass.

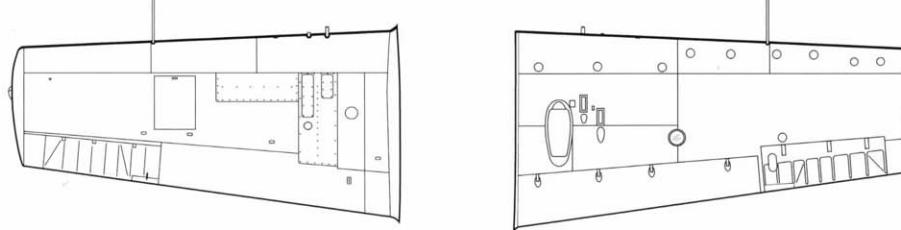
BuNos 1848 through 1896 constituted the first production block of F4F-3s. Both cowling mounted machine guns were deleted and standard armament was changed to four .50 caliber (12.7MM) Browning M2 machine guns – two mounted in each wing. Each weapon was supplied with 430 rounds of ammunition. A windshield having a flat front panel replaced the curved windshield. The wing configuration was revised and included larger gun access panels and internally stored flotation bags for use in ditching situations. The cowling configuration changed during this production block. It is believed that the change occurred on BuNo 1867 and subsequent aircraft and is illustrated in line drawings on page 10.

Eighteen F4F-3s (BuNos 1848 through 1865) were delivered to Fighting Squadron Four (VF-4; later VF-41) during November and December of 1940. This Squadron was assigned to the aircraft carrier USS RANGER (CV-4) and the aircraft had the bright pre-war markings with Glossy Willow Green (FS14187) tail surfaces. The second squadron to receive Wildcats was VF-72, assigned to USS WASP (CV-7). These F4F-3s had the bright pre-war markings, but featured Glossy Black (FS17038) tail sections. VF-72 received 20 aircraft (BuNos 1866 through 1885) between December of 1940 and January of 1941. Both VF-41 and VF-71 operated as part of the Atlantic Fleet's Neutrality Patrol during 1940 and 1941. Neutrality Patrol aircraft were distinctly marked to identify them as American. For this purpose, Wildcats carried a national insignia on the forward fuselage. Interestingly, VF-41 painted this insignia just forward of the cockpit, while VF-72 painted it on the engine cowling. Ten more initial production batch F4F-3s (1887 through 1896) were allocated to VF-71, also aboard WASP. The final aircraft (BuNo 1897) became the **XF4F-4**.

### F4F-3 (BuNos 1848-1865)



F4F-3 (BuNo 1848 & Subsequent) Wing



This F4F-3 (BuNo 1845) was sent to the National Advisory Council on Aeronautics (NACA) facility in Langley, Virginia to test various propeller, spinner, and cowl flap configurations. The aircraft is equipped with three lower cowl flaps and doublewide cowl flaps on the upper cowl. The large spinner and propeller cuffs are noteworthy. (NASA LaRC)

This F4F-3 (BuNo 1848) was the third production F4F. It was delivered to Fighting Squadron Forty One (VF-41) aboard USS RANGER (CV-4). The '1' of VF-41 had yet to be painted on the fuselage. Its tail color was Glossy Willow Green (FS14187). This aircraft was last assigned to USS HORNET (CV-8), and was destroyed in March of 1942. (SDAM)





A disassembled F4F-3 (BuNo 1863) is being transported to the New York World's Fair in May of 1940. Full VF-4 markings have been applied. It appears this aircraft has provisions for cowl guns, something only seen on the first two production F4F-3s. BuNo 1863 was lost in August of 1942 while attached to VMF-111. The propeller spinner was unusual for F4F-3s. (NMNA)

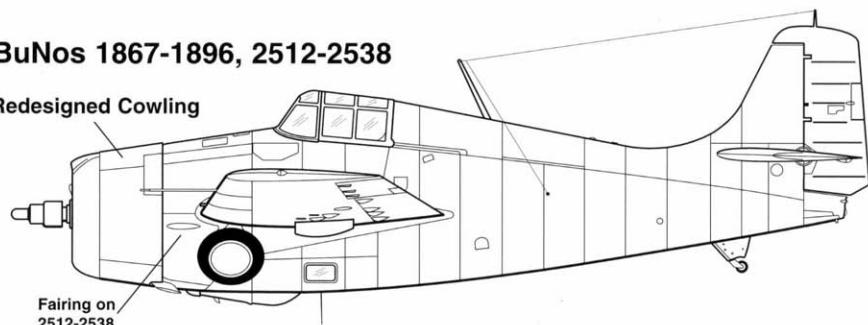
Flotation bags are deployed on this early production F4F-3. These were to be used in the event of a ditching. The bags were deleted following several incidents where the bags deployed in flight. Even at this early stage of production, the main landing gear struts were painted Glossy Black (FS17038). (NMNA)



A 1200 HP Pratt & Whitney R-1830-76 14-cylinder, air-cooled, radial engine supplied power with a two-stage, two-speed supercharger. These aircraft sported the 'cheek' intercooler intakes. Most of the early Wildcats were fitted with a Mk III telescopic gun and bombsight protruding through the windshield. These early Wildcats could also carry two 100 pound (45 KG)

## BuNos 1867-1896, 2512-2538

Redesigned Cowling



bombs on Mk XLI bomb racks; one under each wing. A Mk III gun camera could also be installed on the right forward fuselage. Grumman manufactured 27 F4F-3s in this configuration (BuNos 2512-2538) and delivered them to the Navy in February of 1941. BuNos 2512 through 2520 were assigned to VF-71, while 2521 through 2538 went to VF-42.

Grumman delivered 19 more F4F-3s (BuNos 3856-3874) to the USN in June of 1941. These Wildcats had an internally mounted carburetor scoop, replacing the externally mounted scoop on earlier F4F-3s. In June of 1941, two F4F-3s (3856-3857) were delivered to VF-42, while another two (3860-3861) went to VF-71. An unspecified number also made their way to VF-72. Later still, VF-9 used some aircraft from this batch as trainers prior to Operation TORCH, the Anglo-American invasion of French North Africa in November of 1942.

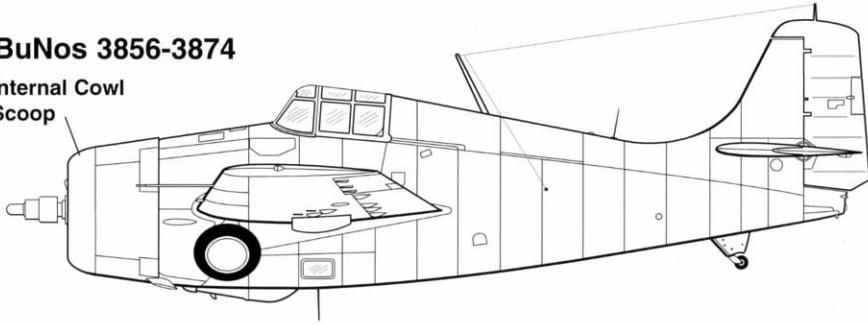
The early Wildcats suffered several early developmental problems. The first of these was an uncommanded deployment of the wing-mounted flotation bags, which were intended for use in the event of a ditching. These bags kept the Wildcat afloat long enough to be recovered. Several incidents occurred where the bags deployed in flight. Another problem was the weakness of the windshield quarterlights. During high-speed dives, these curved panels had a tendency to fail. Aluminum bracing strips were added to rectify this problem. This modification was also made to F4F-3As and to the Martlet Mk II, III, and IV.

Lessons from combat saw the Wildcat modified with armor plating for the cockpit and some portions of the engine. Self-sealing fuel bladders and armored windshield glass were also installed. Shoulder straps were added to the pilot's seat in early 1942. All these modifications added weight to the airframe, which degraded performance with every pound added.

In early 1941, there was a break in F4F-3 production to facilitate manufacture of F4F-3As (BuNos 3875-3904 for Greece, 3905-3969 for the US). F4F-3 production then resumed, with Grumman building 88 aircraft (BuNos 3970-4057) between July and September of 1941.

## BuNos 3856-3874

Internal Cowl Scoop



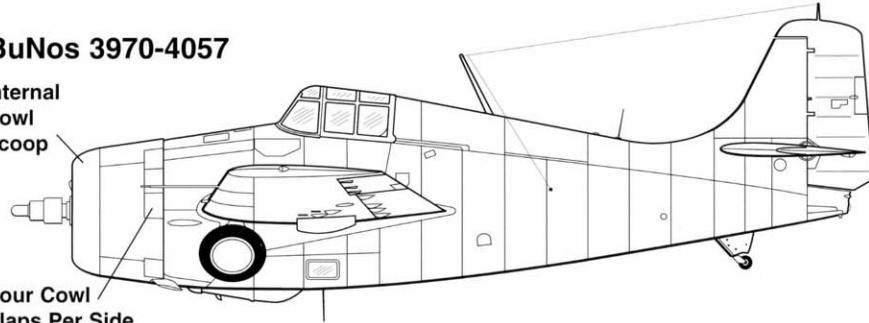
Aircraft from this batch were delivered to Marine Fighter Squadron Two Twenty One (VMF-221), VMF-211, VMF-121, VF-3, and VF-5. The cowling configuration changed yet again with this batch, which was distinguished by a cowling with four cowl flaps per side and no external carburetor scoop. A 1200 HP Pratt & Whitney R-1830-86 14-cylinder radial engine with a two-stage, two-speed supercharger supplied power for these 88 aircraft.

Wildcat production switched to **F4F-4s** with the delivery of the F4F-3 (BuNo 4057); however, the F4F-4 wasn't the final Wildcat version to be manufactured by Grumman. In 1941, Grumman received an order for 100 long-range **F4F-7s**. This contract was later modified to an

### BuNos 3970-4057

Internal  
Cowl  
Scoop

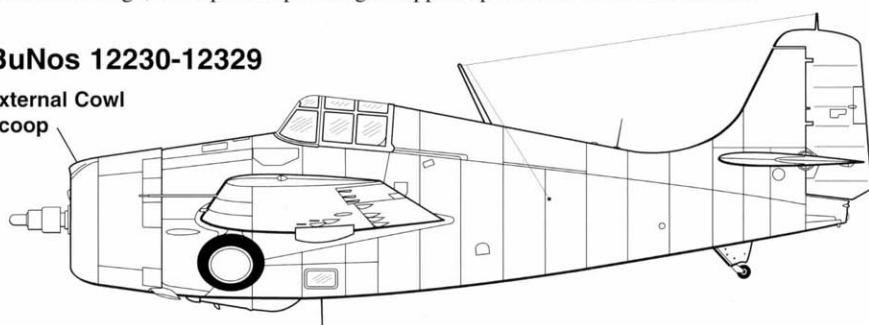
Four Cowl  
Flaps Per Side



order for 100 **F4F-3S 'Wildcatfish'** seaplane fighters. In the end, these F4F-3s (BuNos 12230 through 12329) were delivered as advanced trainers between January and May of 1943. This final F4F-3 production batch had the F4F-4's cowling configuration of four cowl flaps per side and a lip-type carburetor scoop. A 1200 HP Pratt & Whitney R-1830-86 14-cylinder engine with a two-stage, two-speed supercharger supplied power for these 100 aircraft.

### BuNos 12230-12329

External Cowl  
Scoop



By 31 December 1941, 176 F4F-3s were on charge in US Navy and Marine squadrons. VF-5, VF-8, VF-41, VF-42, VF-71, VF-72, VMF-121, and VMF-211 were all fully equipped with F4F-3s, while VF-3 and VF-6 operated small numbers. The Navy and Marines assigned 25 other Wildcats to various commands and Air Stations.

In a twist of irony, on that same date, only two squadrons operated Brewster F2A-3s and it was well on its way out of front line service. It must be remembered that the F2A beat the F4F during competitive trials in March of 1938 and secured a lucrative contract for 54 machines.

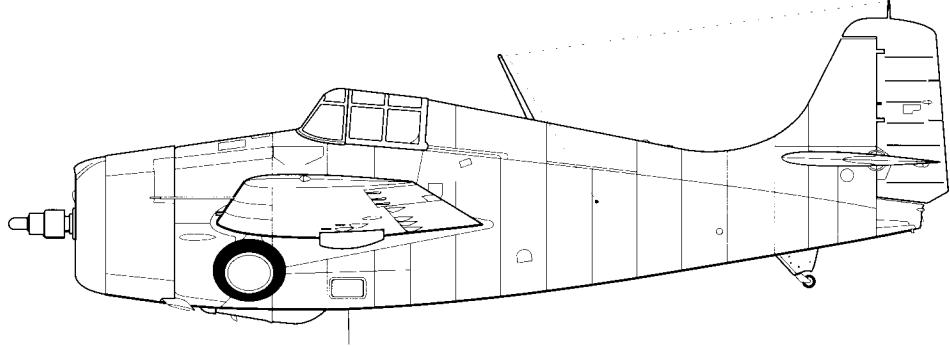
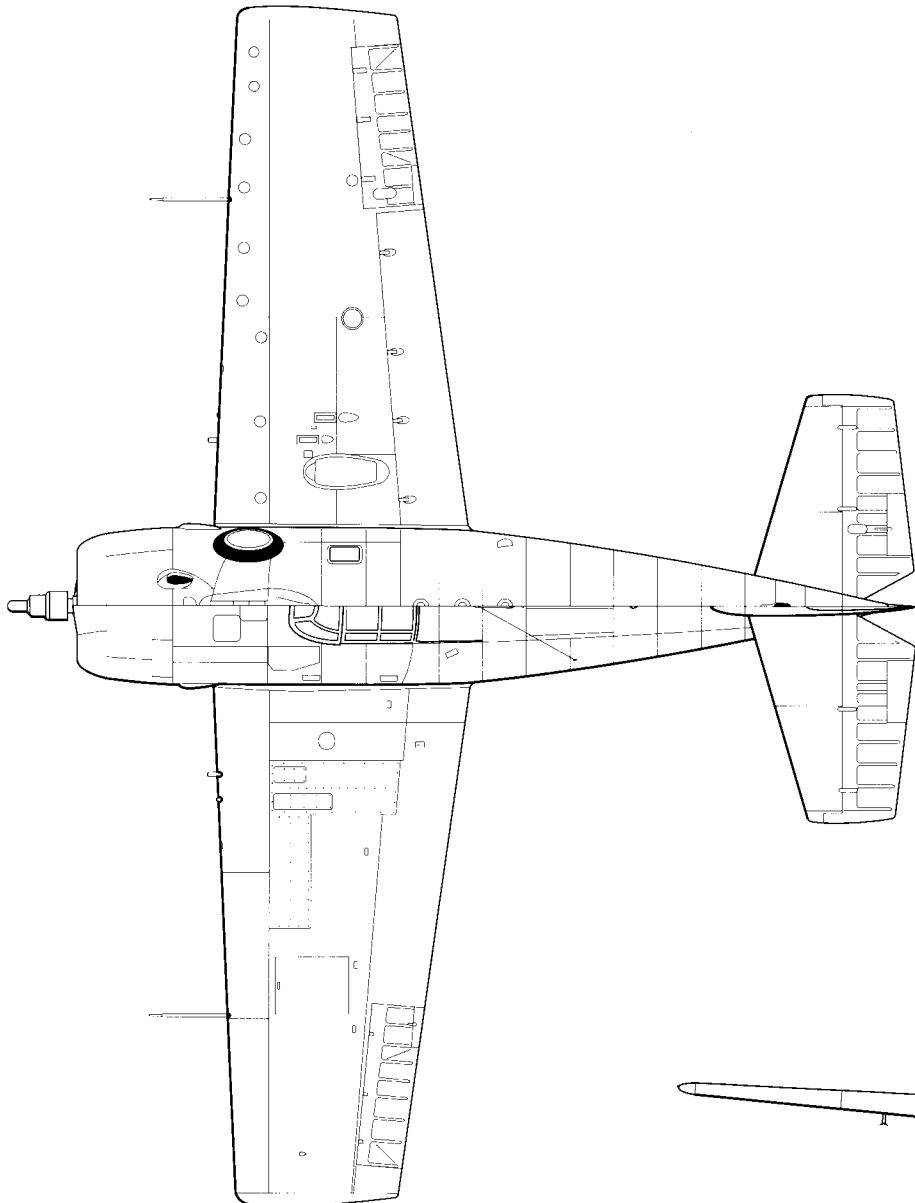
The Japanese attack on Pearl Harbor on 7 December 1941 virtually secured the F4F-3's place in history. It was this Wildcat variant which bore the brunt of air combat by the US Navy and US Marines during the first five months of World War Two in the Pacific.



Three overall Non-Specular (NS) Light Gray (FS36440) F4F-3s fly over the countryside. The bullet-shaped spinner on the propeller was something typically seen on Martlet Mk IIs and FM-2s. The national insignia is painted on upper left and lower right wings and on the fuselage sides. (SDAM)

In an effort to extend the Wildcat's range, Grumman designed a 42-gallon (159 L) non-jettisonable fuel tank that could be fitted to each outer wing panel just outside of the guns. This F4F-3 is also equipped with the rarely seen gun fairings. (Northrop Grumman)





## Grumman F4F-3 Wildcat Specifications

Wingspan:.....38 feet (11.6 M)

Length:.....28 feet 9 inches (8.8 M)

Height:.....11 feet 4 inches (3.5 M)

Empty Weight:.....5236 pounds (2375 KG)

Maximum Weight:..7065 pounds (3205 KG)

Powerplant:.....One 1200 HP Pratt & Whitney R-1830-76 or -86  
14-cylinder, air-cooled, radial engine

Armament:.....Four .50 caliber (12.7MM) Browning M2 machine  
guns with 430 rounds per gun in the wings

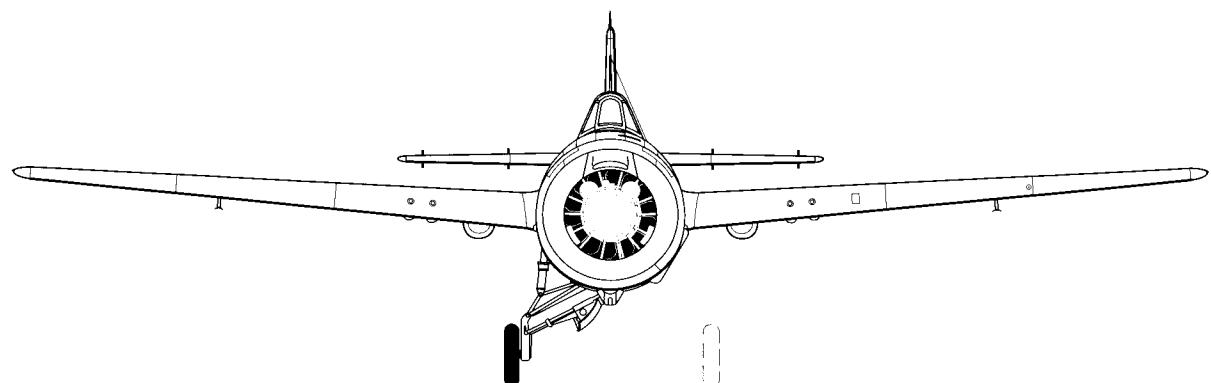
### Performance:

Maximum Speed:331 MPH (533 KMH) at 22,000 feet (6706 M)

Service Ceiling:....37,000 feet (11,278 M)

Range:.....860 miles (1384 KM)

Crew:.....One



This classic portrait of two F4F-3s was taken near Kaneohe Bay, Hawaii on 10 April 1942. LCDR John S. Thach, Commanding Officer (CO) of VF-3, flies in F-1 (BuNo 3976), while LT Edward 'Butch' O'Hare is in F-13 (BuNo 3986). VF-3's 'Felix the Cat' insignia is painted under the windshields of both Wildcats. Thach's aircraft has three Japanese flag 'kill' markings painted under the cockpit. This represents three Japanese aircraft he shot down to that point. O'Hare's Wildcat has five 'kill' markings, which signify the five bombers he downed on 20 February 1942. O'Hare became the US Navy's first air ace and was awarded the Medal of Honor for this exploit. (NHC)

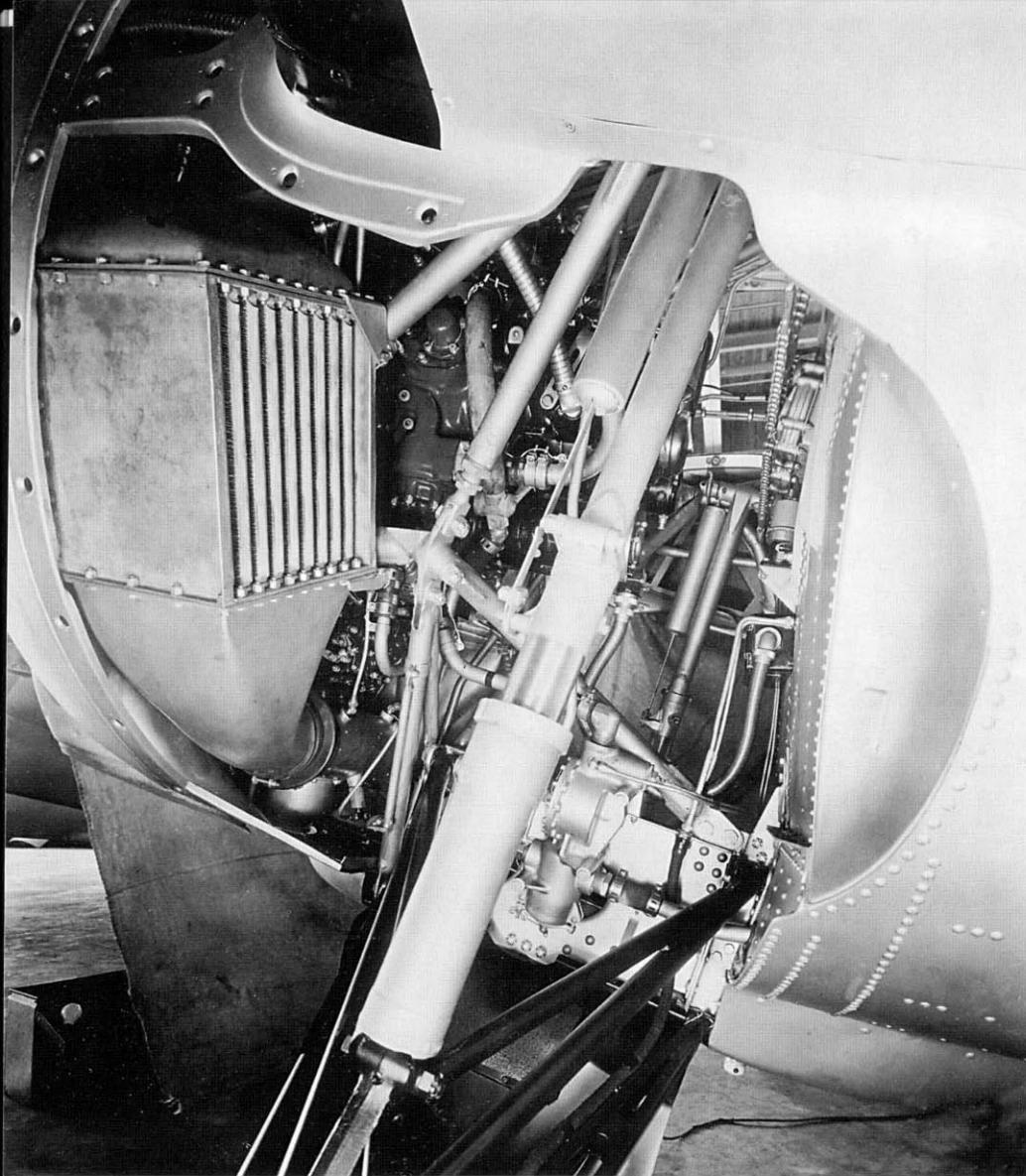


This F4F-3 is seen with its tailhook in the lowered position. The cowling is that of the F4F-4, with four cowl flaps per side and an external carburetor scoop. This leads the author to believe this aircraft came from the final production batch of 100 F4F-3s (BuNos 12230-12329) built during 1943. This batch was the last of the Wildcats built by Grumman. (NHC)



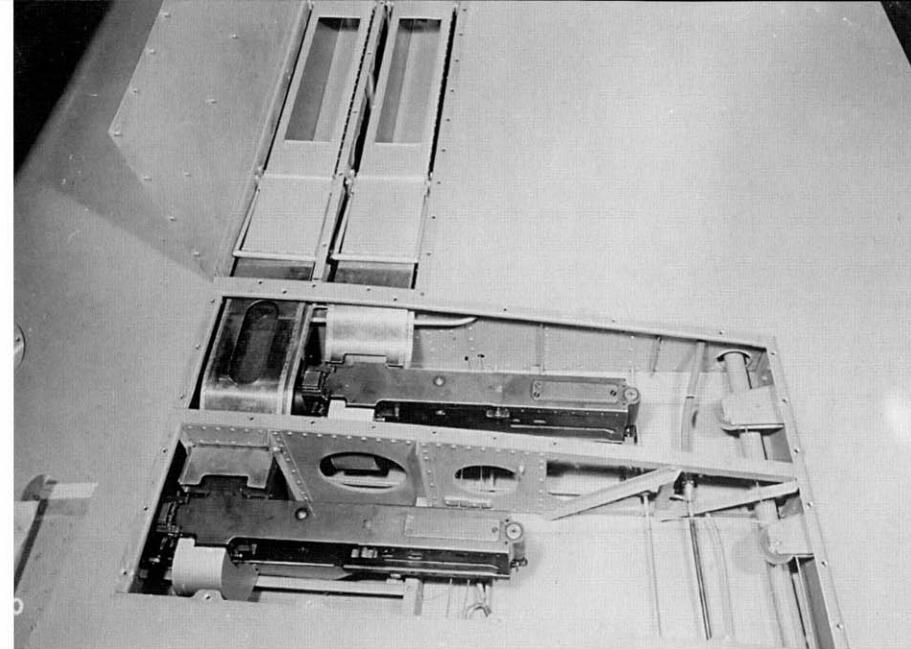
Two overall Orange-Yellow F4F-3s fly over the countryside in late 1943, with the Non-Specular Insignia Red (FS31136) bordered national insignia. The aircraft in the foreground is the second production F4F-3 (BuNo 1845) and has been fitted with a Hamilton Standard propeller. The rear aircraft is BuNo 3990 and came from the second-to-last production run of F4F-3s. There is an unusual cowl bump on 3990. (SDAM)





(Above) The wheel bay housed the landing gear, the supercharger intercooler, and the aft engine accessory section. The landing gear retraction chain runs in front of the firewall. The lower portion of the landing gear assembly is painted Black. (Northrop Grumman)

(Right) The Fairchild F-56 camera assembly was carried by Wildcat photo reconnaissance versions, including the F4F-3P, F4F-3AP, and F4F-7. The F-56 had an 8.5 inch (21.6 cm) focal length and was mounted in the fuselage just aft of the cockpit compartment. (Fairchild)



The starboard gun bay covers are removed on this F4F-3. The .50 caliber (12.7mm) machine guns are 65 and 75 inches (165 and 191 cm) from the aircraft centerline. Recharging handles for the guns were just below the pilot's seat. The guns' stagger caused the inboard weapon to protrude from the wing. (Northrop Grumman)



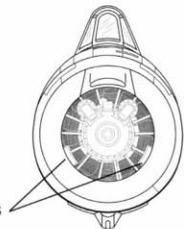
# XF4F-6

While war production geared up throughout the world, aircraft engine demand increased accordingly. This fact, along with the developmental delays being encountered with the two-stage supercharger in the Pratt & Whitney R-1830 series engines, prompted the Navy to order two **XF4F-5s** (BuNos 1846 and 1847). These aircraft were used to evaluate the 1200 HP Wright R-1820-40 nine-cylinder, single row radial engine. The Navy also ordered one **XF4F-6** (BuNo 7031), which differed by having a Pratt & Whitney R-1830-90 14-cylinder, two-row radial engine with a single-stage, two-speed supercharger. Production F4F-3s were equipped with either the R-1830-76 or -86 engine equipped with two-stage, two-speed superchargers, which gave enhanced performance at altitude.

A single XF4F-6 (c/n 737/BuNo 7031) was completed and flown for the first time on 11 October 1940 and delivered to NAS Anacostia on 26 November 1940. It was found to have similar performance to the standard F4F-3, with performance differences most noticeable at altitude. Its service ceiling was 34,000 feet (10,363 m), compared to the F4F-3's 37,000 feet (11,278 m). Following this evaluation, the XF4F-6 was used as a test aircraft for a variety of cockpit control evaluations. It was destroyed in a crash on 25 May 1942, which killed the pilot.

Because of the difficulties encountered with the two-stage R-1830s, the Navy decided to purchase a limited number of R-1830-90-powered Wildcats designated F4F-3As. Delivery of the first F4F-3A to Marine Fighting Squadron One Eleven (VMF-111) at Quantico, Virginia took place in April of 1941.

**F4F-3**



Intercoolers

**F4F-3A**



Intercoolers  
Deleted

The XF4F-6 (BuNo 7031) was considered the prototype for the F4F-3A and Martlet Mk III. It served as the test bed for the Pratt & Whitney R-1830-90 single-stage, two-speed supercharger. This aircraft is equipped with a domed and uncuffed Curtiss Electric propeller. (Northrop Grumman)



# F4F-3A Wildcat

Delivery of reliable and sufficient quantities of two-stage supercharged engines was by no means certain. This resulted in the US Navy placing an order for the production version of the XF4F-6, designated the F4F-3A.

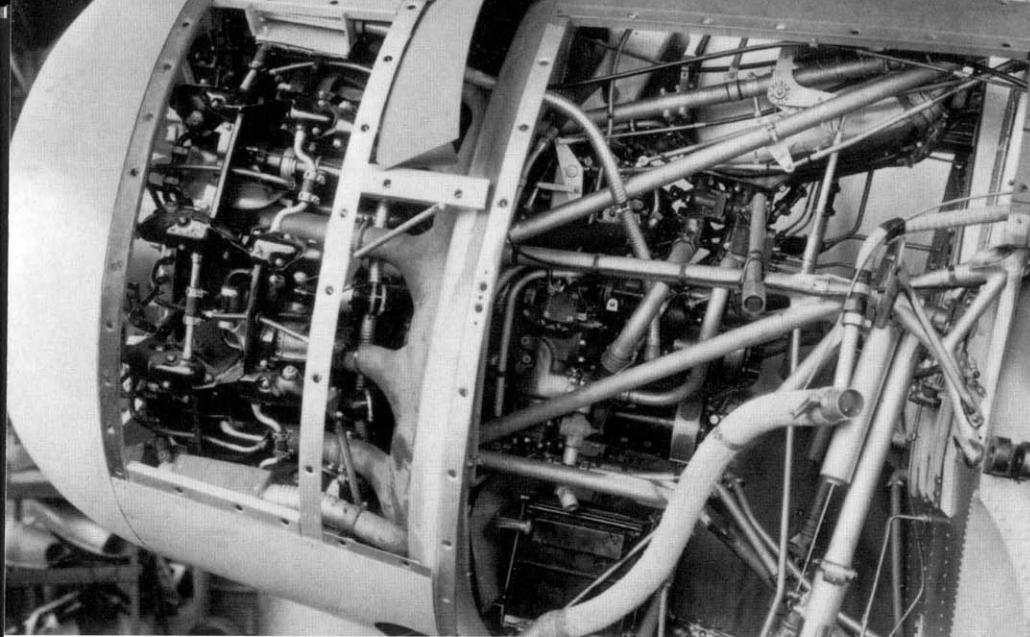
Prior to initial delivery to American forces, the Greek Purchasing Commission ordered 30 F4F-3As (BuNos 3875-3904) for their struggle against the Axis powers. The contract was signed on 8 May 1940. These aircraft were en route to Greece at the time of their surrender in April of 1941. The cargo ship with these aircraft reached Port Suez, Egypt in early April of 1941, at which time these aircraft were diverted for British Royal Navy use under the designation **Martlet Mk III**.

The remaining 65 aircraft (BuNos 3905-3969) were all produced during 1941, with VMF-111 receiving their first aircraft in April of that year. By the end of 1941, the major users were VMF-111, VF-6, and Advanced Carrier Training Group (ACTG) Atlantic. The other units assigned F4F-3As included VF-2, VF-3, VF-5, VF-8; NAS Norfolk, Virginia; Battle Force (BatFor) San Diego, California; and BatFor Pearl Harbor, Hawaii. One F4F-3A (BuNo 3918) was converted to an F4F-3P photo reconnaissance aircraft. Several F4F-3As were modified with a reinforcing strip on the curved sections of the Plexiglas windshield. This retrofit was made following a number of windshield failures.

F4F-3As saw much combat action during the first months of the war, with VF-6 being the primary Navy operator. VF-6 flew varying numbers of F4F-3As off USS ENTERPRISE (CV-6) from December of 1941 through March of 1942, when they were replaced by F4F-4s in time for the Doolittle Raid on Japan on 18 April. All four Wildcats of VF-6 that were destroyed at Pearl Harbor on the night of December 7th were F4F-3As. One F4F-3A with VF-2 was aboard USS LEXINGTON (CV-2), but it was lost at the Battle of the Coral Sea in May of 1942. VMF-212 also operated at least 21 F4F-3As during their time in the Solomons. At least two F4F-3As are known to exist, including BuNo 3969, which was recovered from Lake Michigan. The San Diego Aerospace Museum restored this Wildcat for display at the National Museum of Naval Aviation in Pensacola, Florida.

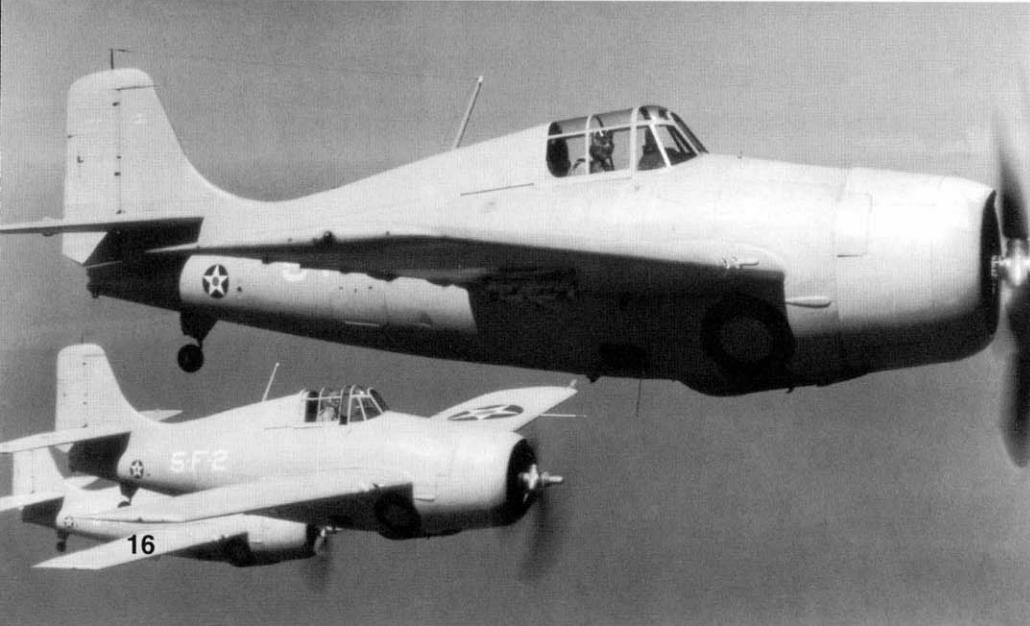
This F4F-3A (BuNo 3905) was the first production F4F-3A delivered to the US Navy. Thirty (BuNos 3875-3904) aircraft from an original order for 95 were diverted to the Greek Air Force, but Greece fell to the Axis while the aircraft were en route. Eventually, these 30 F4F-3As were turned over to the British. The remaining 65 F4F-3As (BuNos 3905-3969) were delivered to USN and USMC squadrons. (Northrop Grumman)





The primary recognition feature of the F4F-3A was the single-stage supercharger, which is barely visible through the aft accessory section struts and piping. This supercharger did not require induction air-cooling between supercharging stages, because there was only one stage. Therefore, the intercoolers and associated ducting were not present on the F4F-3A. (Northrop Grumman)

VF-5's First Section F4F-3As are finished in the pre-war NS Light Gray (FS36440) paint scheme with extremely small national insignias on the fuselage. The aircraft are fitted with the additional windshield bracing that appeared after several windshield failures. The aircraft in the foreground is BuNo 3927. (Northrop Grumman)



## F4F-3P Wildcat

The US Navy modified 17 F4F-3s and one F4F-3A for reconnaissance missions. To facilitate this modification, the reserve fuel tank behind the pilot was removed, reducing fuel capacity from 147 gallons (556 L) to 117 gallons (443 L). The F4F-3P retained the standard F4F-3's four-gun armament; however, a Fairchild F-56 camera was mounted in the lower fuselage aft of the main fuel tank. A sliding rectangular hatch manipulated by the pilot kept the camera from getting dirty. The following aircraft were modified:

F4F-3: BuNos 1849, 1852, 1856, 1867, 1870, 1871, 1872, 1880, 1894, 2512, 2517, 2534, 2526, 2530, 2537, 3985, 3997

F4F-3A: BuNo 3918

While only 18 F4F-3/3As were modified to F4F-3P configuration, they did see limited service, primarily in the Solomons during the fierce exchanges of the Guadalcanal campaign in 1942-43. A majority of these were operated by Marine Observation Squadron Two Fifty One (VMO-251). Additionally, Navy photographic squadrons (VDs) operated some F4F-3Ps.

VMO-155 was assigned to Marine Air Group Thirteen (MAG-13) and drew its personnel from Samoa-based VMO-151. These men were transferred back to the United States for training, which took place off the coast of San Diego. A three-aircraft detachment was assigned to the escort carrier USS NASSAU (CVE-16) for the invasion of Attu Island in the Aleutian chain. Three F4F-3Ps, 20 F4F-4s, and one Curtiss SOC were aboard during this operation. Two of these three F4F-3Ps have been identified: BuNo 3997, which was stricken following a deck crash on 6 May 1943, and BuNo 2526 was lost at sea with the pilot aboard on 16 May 1943.

A Marine Observation Squadron Two Fifty One (VMO-251) F4F-3P (251MO5) undergoes servicing at Espiritu Santo, New Hebrides in 1942. Two Grumman J2F Ducks are parked near the Wildcat. (Brandon Wood)



# F4F-7 Wildcat

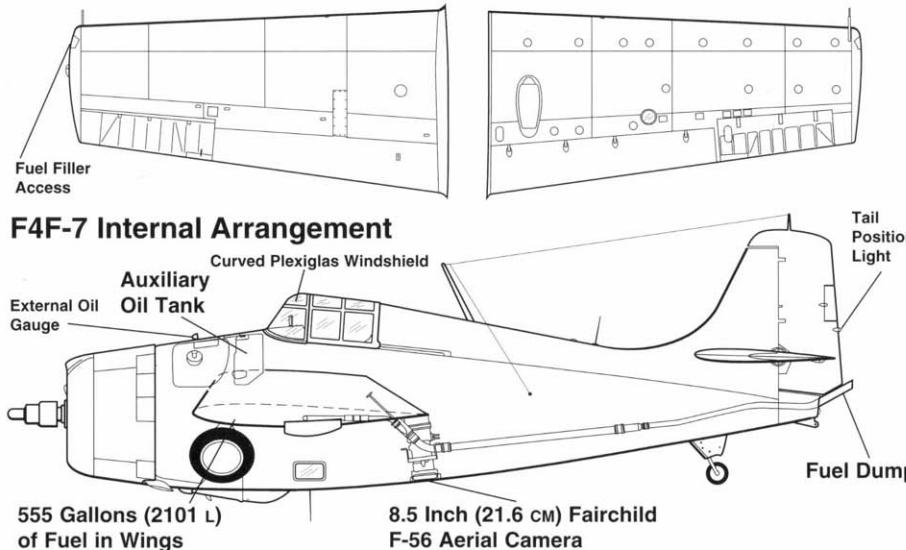
Recognizing the need for a long-range reconnaissance aircraft well before the attack on Pearl Harbor, the US Navy's Bureau of Aeronautics (BuAer) approached Grumman to determine the feasibility of converting two standard F4F-3 airframes to meet this need. By the end of January of 1941, Grumman and the Navy agreed and development of this specialized aircraft began. Even before conversion work started on the two airframes, the Navy increased its requirement and asked Grumman to build 21 aircraft, designated F4F-7, based on the upcoming F4F-4 airframe.

These 21 F4F-7s (BuNos 5263-5283) were unique in Wildcat production. They featured non-folding wings capable of carrying 555 gallons (2101 L) of fuel. This coupled with the 117-gallon (443 L) fuselage tank located below the pilot made for a total fuel capacity of 672 gallons (2544 L)! A Fairchild F-56 camera was mounted in the fuselage, eliminating the auxiliary fuselage tank. This camera was mounted slightly left of centerline, immediately aft of the fuselage fuel tank. The F4F-7's key recognition feature was a fuel dumping system, which enabled the pilot to get the aircraft down to a reasonable landing weight should an emergency landing be required. This dump consisted of two pipes running from the fuel tanks aft to two fuel vents located at the base of the rudder. Because of the vent location, the tail navigation light was repositioned to the rudder, just under the trim tab. All armament and related equipment was removed from the F4F-7.

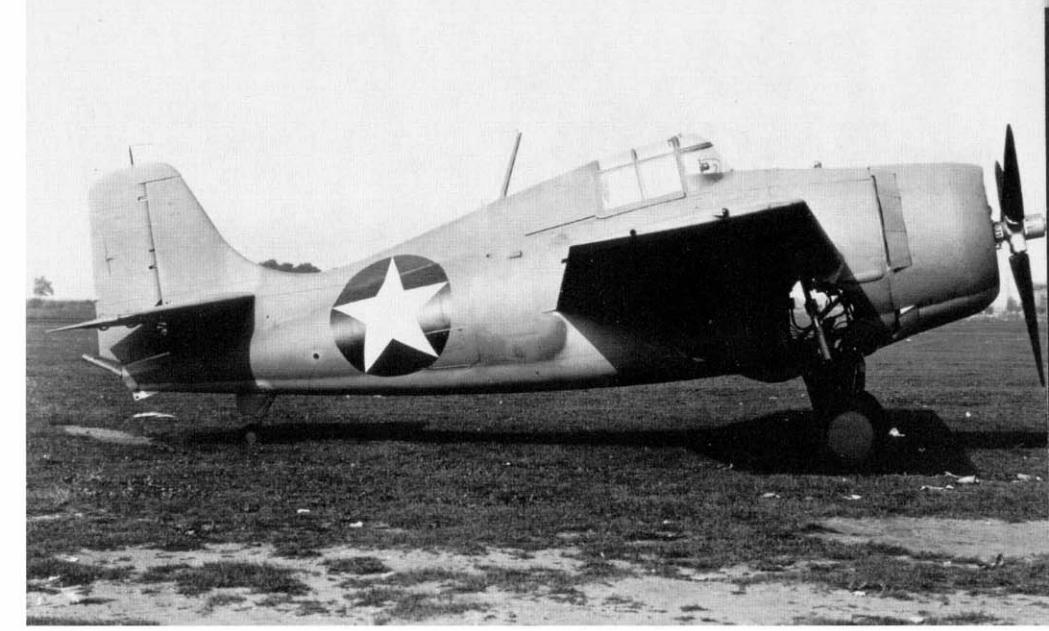
Because of the extended flight durations that would be encountered, the F4F-7 also featured two oil tanks located forward of the pilot. An external oil gauge was fitted to the primary tank and can be seen in photos. Finally, a curved Plexiglas windshield, an L-shaped pitot tube, and an autopilot were installed.

The F4F-7's first flight took place on 30 December 1941. The aircraft's gross weight was an amazing 10,328 pounds (4685 kg). Its range was said to be 3700 miles (5954 km), with a flight endurance of 24 hours.

The F4F-7 served primarily with Marine Observation Squadron Two Fifty One (VMO-251). At various times, six F4F-7s (BuNos 5263, 5265, 5268, 5270, 5271, and 5272) were assigned to the Squadron while at Espiritu Santo. One was typically assigned to each carrier during the Guadalcanal campaign in 1942-43. The Navy ordered over 100 F4F-7s; however, only 21 aircraft were produced.



## F4F-7 Internal Arrangement



An F4F-7 (BuNo 5274) is parked at the Grumman factory. The distinctive fuel dumping pipes are mounted immediately below the rudder. This variant had a non-armored curved Plexiglas windshield. F4F-7s had non-folding wings with no armament. The oil gauge is mounted atop the fuselage forward of the cockpit. (Tailhook)

An extreme rarity. This is one of only a handful of known photos of an F4F-7 in an operational environment. No guns are present in the wings and the curved Plexiglas windshield is plainly visible. The number 14 is located on the lower cowling and national insignias are painted in six places. (Brandon Wood)





**The F4F-3S (BuNo 4038) as seen in its initial configuration, without the large ventral fin. Twin Edo Corporation floats were installed, as were two finlets on the horizontal stabilizers for added directional stability. A Mk XLI bomb rack is barely visible under the starboard wing. (Northrop Grumman)**

The sole F4F-3S (BuNo 4038) makes a takeoff run in open water near NAS Norfolk, Virginia. The aircraft is shown here without the large ventral fin that was added to improve directional stability. The F4F-3S is fitted with the additional windshield brace that was retrofitted to other Wildcat variants. (NMNA)



## F4F-3S 'Wildcatfish'

During the fall of 1942, the American forces in both the Aleutian and Solomon Islands encountered a 'float fighter' based on the Mitsubishi A6M Zero fighter. Nakajima manufactured this aircraft, the A6M2-N (Allied code name Rufe), which had a respectable performance and was used by the Japanese until adequate airstrips for land-based fighters could be built.

Encountering much the same problem, the US Navy became interested in a float fighter. In the Fall of 1942, the Navy contracted for one F4F-3 modified with twin Edo floats with the designation F4F-3S. Grumman selected one F4F-3 (BuNo 4038) for modification and it was sent to the Edo Corporation for modification. The result was an aircraft with two large floats, as opposed to the Rufe's single large float and wingtip outriggers. Additionally, the now empty landing gear wells were faired over with sheet aluminum. Lastly, two small auxiliary finlets were installed on the horizontal stabilizers to increase directional stability.

Grumman test pilot T. F. 'Hank' Kurt flew the F4F-3S on its first flight on 28 February 1943. Its performance was well below nominal F4F-3 performance figures, with the F4F-3S having a top speed of 266 MPH (428 KMH). Test pilot Kurt found directional stability lacking and the aircraft was subsequently modified with a large ventral fin at the extreme lower fuselage.

By the time of its first flight, the crisis on Guadalcanal and the Aleutians had eased. This coupled with the ability of the Navy's Construction Battalions (Seabees) to construct airstrips on newly captured islands in an amazingly short period of time rendered the F4F-3S obsolete.

Following trials in open water near NAS Norfolk, the Navy modified its order for 100 F4F-7s to an order for 100 F4F-3S Wildcatfish. These production plans never materialized and the 100 aircraft (BuNos 12230-12329) were eventually delivered as standard F4F-3s for use as fighter trainers in 1943.

**The F4F-3S (BuNo 4038) is displayed following the installation of a large ventral fin under the aft fuselage. The landing gear openings are faired over with sheet metal. This aircraft retained the four-gun armament of the F4F-3 and also carried a Mk XLI bomb rack under each wing. (Northrop Grumman)**



# XF4F-5

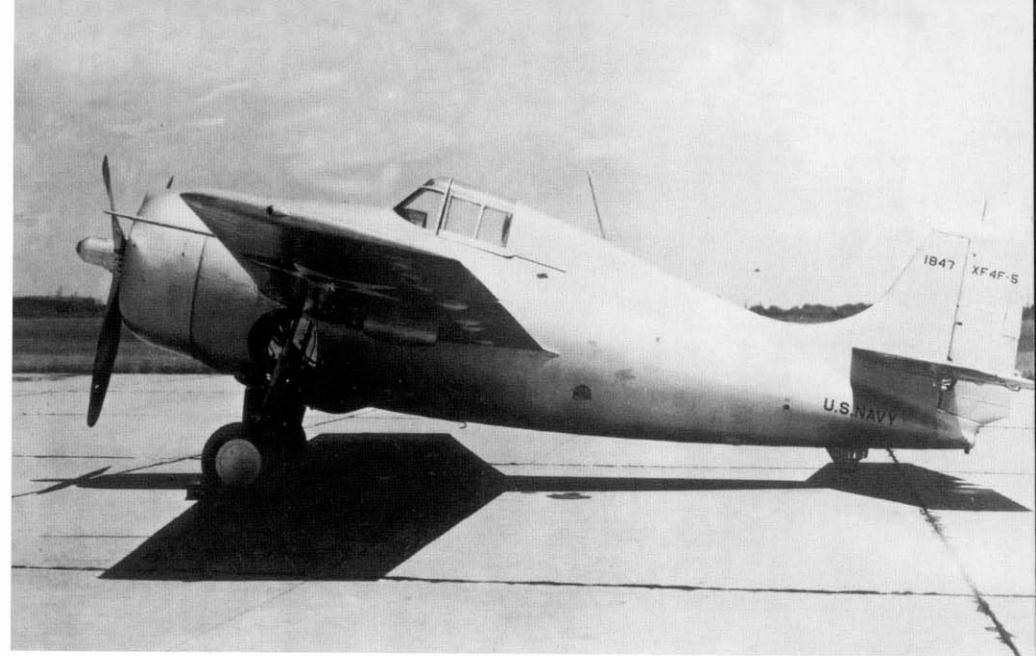
Persistent problems with the R-1830's two-stage supercharger prompted the US Navy to seriously consider alternate powerplant arrangements for the Wildcat. This prompted the Navy to amend its original production contract. The third and fourth production F4F-3s (BuNos 1846 and 1847) were modified to accept the 1200 hp Wright R-1820-40 Cyclone nine-cylinder, air-cooled, radial engine with single-stage supercharger.

The XF4F-5's initial flight occurred in June of 1940, with delivery to NAS Anacostia taking place the following month. During evaluation, it reached a top speed of 306 MPH (492 KMH) at 15,000 feet (4572 m). Performance deteriorated at higher altitudes, due to the single-stage supercharger.

The two XF4F-5s appeared externally similar to the G-36A/Martlet Mk I when delivered. A shorter chord cowling, characteristic of Wright-powered Wildcats, was used. It featured no cowl flaps and an external carburetor scoop at the top. The XF4F-5s were also fitted with Hamilton Standard Hydromatic constant speed three-bladed metal propellers.

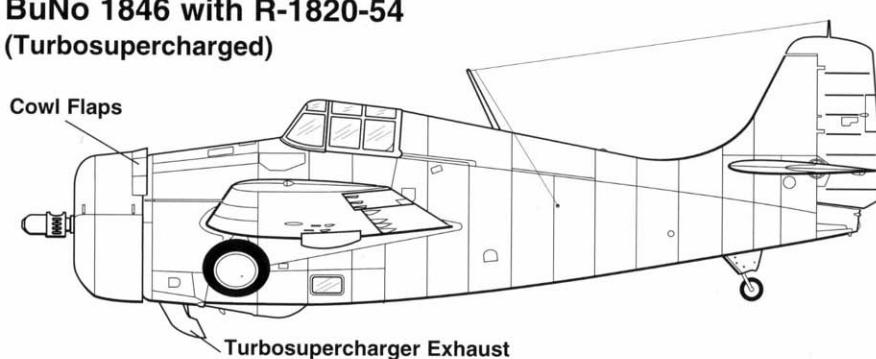
Both aircraft were modified again near the end of 1942, this time to test different supercharging/turbosupercharging installations. BuNo 1846 received a Wright R-1820-54 turbosupercharged engine. Other changes made to this aircraft included a series of cowl flaps on the top of the cowling, roughly between the 10 o'clock and 2 o'clock positions. Additionally, a large single exhaust stack projected downward just forward of the landing gear. Performance evaluations revealed a top speed of 340 MPH (547 KMH) at 26,500 feet (8077 m).

The second XF4F-5 (BuNo 1847) received an XR-1820-48 engine equipped with a two-stage supercharger. Distinguishing characteristics included a short-chord cowling with no cowl flaps, jet-style exhausts, and oil coolers being relocated from the normal underwing position to the engine accessory section. This installation bore similarity to the XF4F-8. Top speed on this aircraft was 316 MPH (509 KMH) at 19,500 feet (5944 m). No production models of the XF4F-5 were built.

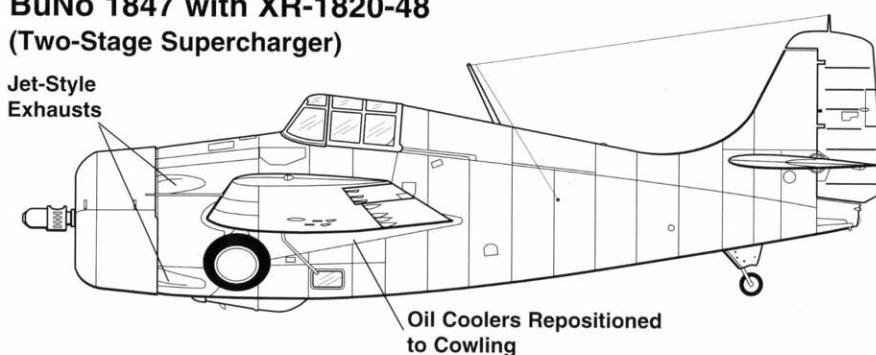


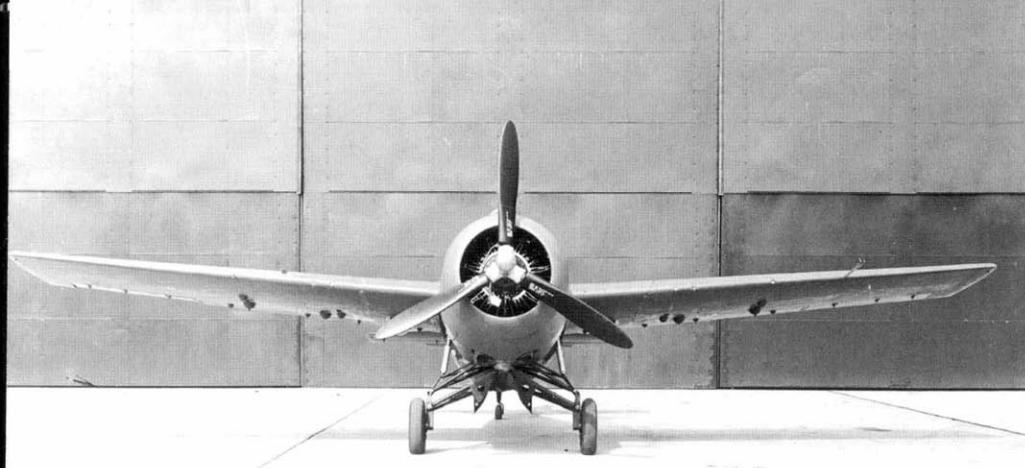
The XF4F-5 (BuNo 1847) in its as-delivered configuration, with a short-chord cowling and no cowl flaps. Also visible is the Hamilton Standard Hydromatic constant speed propeller. This aircraft was later re-engined with the XR-1820-48 Cyclone with a two-stage supercharger. (Northrop Grumman)

## BuNo 1846 with R-1820-54 (Turbosupercharged)



## BuNo 1847 with XR-1820-48 (Two-Stage Supercharger)





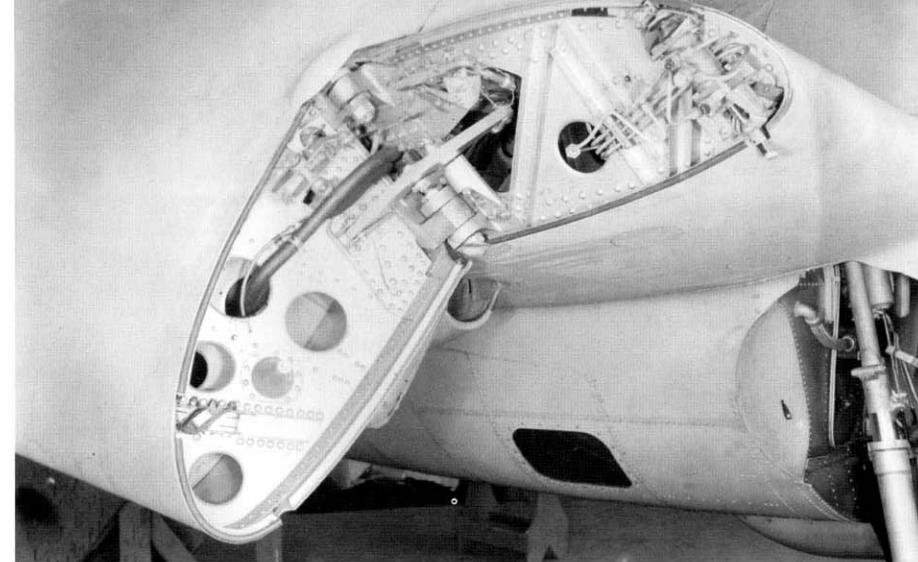
BuNo 1897, originally contracted for as an F4F-3, was modified to become the XF4F-4. The major change that came with the XF4F-4 was the installation of folding wings. This feature reduced the aircraft's 'footprint' considerably, the 38-foot (11.6 m) wings folding aft to give the Wildcat a folded span of 14 feet 4 inches (4.4 m). (NMNA)

## XF4F-4

Space is always at a premium aboard ships at sea, particularly aircraft carrier flight and hangar decks. It was no wonder that the Navy modified its initial F4F-3 production contract in early 1940. They directed Grumman to deliver the final F4F-3 of the initial production batch (BuNo 1897) with a set of hydraulically folding wings. None other than Leroy Grumman himself devised the folding method, called 'sto-wing.' The wing folded aft and rotated nearly 90° to a folded position parallel with the fuselage. This feature reduced the Wildcat's wingspan from 38 feet (11.6 m) to only 14 feet 4 inches (4.4 m).

It is worthwhile at this point to explain the changes in the aircraft's structure to accommodate the folding wing assembly. The Wildcat's wings were bolted to the fuselage at three points, two on the main spar and one on the aft spar separated by 51 13/32 inches (130.5 cm). This was constant throughout the Wildcat series, non-folding and folding wings alike. On the F4F-3/7, the main spar extended out laterally from the main spar attachment fittings. This was not the case on the folding wing versions, whose wings were made in two sections: the stub wing and the outer panel. The outer panel pivoted during the folding process at a point approximately six inches (15.2 cm) further aft than the F4F-3/7's main spar. Since Grumman wished to place the fold pivot at the strongest point on the wing, this meant that the main spar would be further aft on the outer panel. To accommodate these factors, Grumman 'swept' the main spar aft approximately 18° in the stub wing. From here, the main spar then extended laterally to the wingtip.

Another change that came with the folding wing was armament location. To make room for the folding mechanism, it was necessary to move the guns further outboard in the wing. On earlier aircraft, the guns were placed 65 inches (165 cm) and 75 inches (191 cm) from the aircraft centerline. The F4F-4's inboard gun was 12 inches (30.5 cm) further out in the wing. These weapons were placed at 77 inches (195.6 cm), 86 inches (218.4 cm), and 123 inches (312.4 cm) from the aircraft centerline.

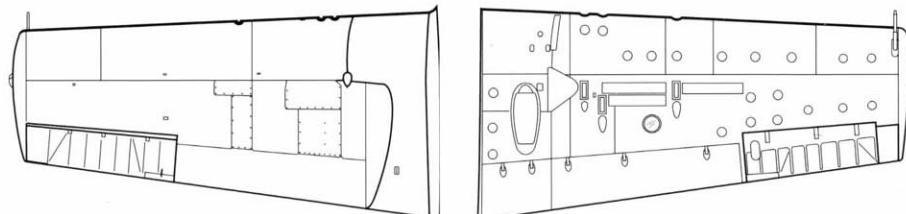


F4F-3 (BuNo 1897) was the only Wildcat to have hydraulically-actuated folding wings. At 7750 pounds (3515 kg) after the installation of the folding mechanism and hydraulics (nearly 400 pounds/181 kg) and armor, ammunition and fuel (nearly 300 pounds/136 kg), this aircraft's performance was degraded to such a point that it was decided to delete the hydraulic feature of the folding wing to save weight. (Northrop Grumman)

By April of 1941, conversion to a hydraulically folding wing on BuNo 1897 was completed. A standard F4F-3 had a gross weight of 7065 pounds (3205 kg). Installation of the folding mechanism and armor increased the gross weight to 7750 pounds (3515 kg) and performance suffered accordingly.

Following acceptance trials, the XF4F-4 was delivered to VF-42 at NAS Norfolk, Virginia in May of 1941. BuNo 1897 went to sea aboard the carrier USS YORKTOWN (CV-5) for evaluation that summer. Later in 1941, the aircraft was transferred to NAS San Diego, where it was taken on strength by VF-3. The aircraft went to sea three times aboard USS SARATOGA (CV-3) between December of 1941 and mid-January of 1942. A Fleet Air Tactical Unit report written in December of 1941 noted that the increase in weight caused a noticeable decrease in performance. BuAer officials requested that production aircraft be no more than 7500 pounds (3402 kg). In order to reach this desired weight, it was determined that the production F4F-4 should not have the hydraulic folding feature. For production aircraft, the hydraulic wing fold was replaced by manually folded wings and the aircraft had a gross weight of 7489 pounds (3397 kg).

## F4F-4 Wing



# F4F-4 Wildcat

Following successful testing of the XF4F-4 in 1941, the US Navy ordered 436 F4F-4s in June of the same year. Production commenced late in 1941 and five had been delivered to the Navy by the end of that year. The first deliveries to squadrons commenced in early 1942, with the initial aircraft going to the East Coast. In late March, VF-6 aboard the carrier USS ENTERPRISE (CV-6) took delivery of eight F4F-4s. By the time ENTERPRISE and HORNET (CV-8) left Hawaii for the Tokyo raid (18 April), VF-6 had 22 F4F-4s and five F4F-3s, while HORNET's VF-8 had 30 F4F-4s. These were the first operational F4F-4s.

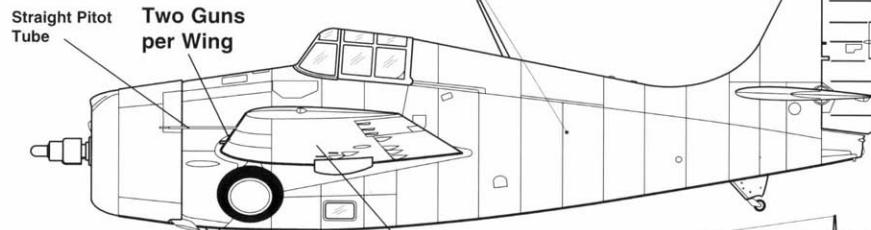
The F4F-4's introduction to the fleet was not a joyous affair to the pilots who flew them. The addition of a wingfold mechanism, two additional .50 caliber (12.7MM) machine guns, and full armor made the F4F-4 nearly 700 pounds (318 kg) heavier than its predecessor. Performance suffered accordingly. Commanders liked the F4F-4 because more could be carried aboard ship due to the folding wing. This variant featured an armament of six .50 caliber (12.7MM) Browning M2 machine guns in the folding wings. Additionally, the long straight pitot tube was moved from just outboard of Wing Station 154 on the F4F-3 to a smaller 'L' shaped unit just inboard of Wing Station 222 on the F4F-4. This change was made to resolve clearance issues with the pitot tube and the ground during the wing fold sequence. Finally, the cowling was fitted with four cowl flaps per side and an external carburetor scoop.

This variant's actual combat introduction did not occur until the Battle of Midway on 4-7 June 1942, when all three US carriers – ENTERPRISE, HORNET, and YORKTOWN (CV-5) – each carried 27 F4F-4s into battle. During a period from 28 May to 13 June, the combined force lost 23 F4F-4s during the battle and one other aircraft in an operational mishap.

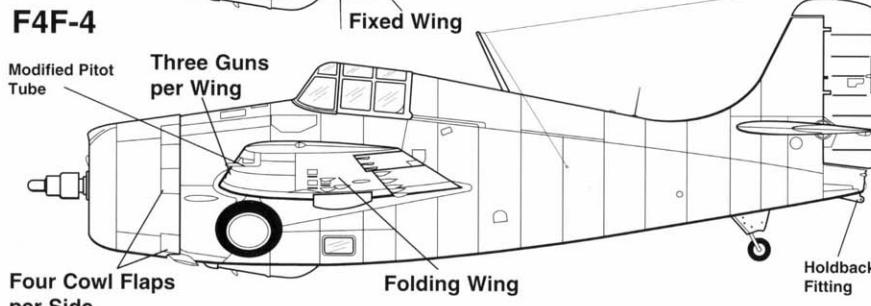
Following the Battle of Midway, Navy and Marine Corps fighter squadrons continued to re-equip with the F4F-4. By the time the Guadalcanal campaign began on 7 August 1942, F4F-4s were operating with all three carrier-based squadrons in the campaign: VF-5 on SARATOGA, VF-6 on ENTERPRISE, and VF-71 on WASP.

There can be little doubt of the significance of the contribution that Marine Corps and Navy

## F4F-3 (Typical)



## F4F-4



One of the early F4F-4s is painted overall Non-Specular (NS) Light Gray (FS36440). National insignia are painted on the aft fuselage, upper port wing, and lower starboard wing. This aircraft retained the capability to carry two 100 pound (45 kg) bombs on Mk XLI racks under each outer wing panel. (NMNA)

An F4F-4 prepares to launch from the deck of USS ENTERPRISE (CV-6) sometime in early 1942 as evidenced by the early war-style national insignia. The paint scheme during this time was NS Blue-Gray (FS35189) over NS Light Gray (FS36440). This scheme was authorized on US Navy and Marine aircraft from 13 October 1941. National insignia were painted on both upper and lower wing positions (port and starboard) and the aft fuselage. (NMNA)





**This F4F-4 (33) has a 42-gallon (159 L) wing tank jury-mounted as a drop tank on the aircraft's fuselage. The Wildcat was flying alongside another US aircraft during the Guadalcanal campaign. (Northrop Grumman)**

**This F4F-4 is seen being transferred from the aircraft transport USS KITTY HAWK (APV-1) to the escort carrier USS LONG ISLAND (CVE-1) while in port at New Hebrides on 28 August 1942. There was minimal clearance between the 42-gallon tank and the ground with this installation. (NHC)**



22

Wildcats made in the defense of Guadalcanal in the Solomon Islands. Once the airstrip at Lunga Point (Henderson Field) was secured and made operational, Marine squadrons operated tirelessly to prevent the Japanese from retaking the contested island. The first was MAJ John Smith's VMF-223, which was catapulted from the escort carrier USS LONG ISLAND (CVE-1). The end of August saw the arrival of MAJ Robert Galer's VMF-224 and SARATOGA's VF-5 (temporary) at the newly commissioned 'Fighter One' airstrip. Over the next six months in addition to the squadrons listed above, Marine squadrons VMF-112, 121, 122, 212, and VMO-251 also fought from the fields at Guadalcanal, along with the Navy's VF-10. Other Navy F4F-4s from VF-6, VF-71, and VF-72 saw action from either carriers or Espiritu Santo in New Hebrides, southeast of Guadalcanal.

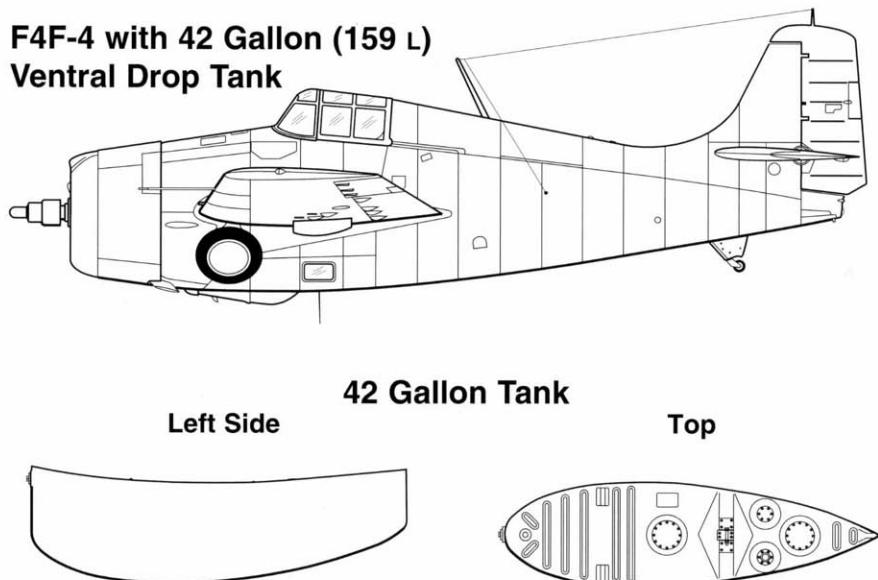
It was during this period of the Pacific War where the Wildcat's lack of range became apparent. The 147-gallon (556 L) fuel capacity severely limited the F4F's range. In the spring of 1941, the Chief of Naval Operations suggested that carrier fighters be given more range for operations over open ocean. BuAer then asked Grumman to study ways to increase the F4F-3's range. Grumman's answer came in the shape of two 42-gallon (159 L) non-jettisonable fuel tanks, one under each wing.

In early 1942, a number of these tanks were made available at Pearl Harbor where an F4F-4 (BuNo 5050) was modified to accept one of these tanks under the fuselage. This modification allowed the tank to be droppable. Once found workable, the modification was made to several other F4F-4s. It appears the most common use of this configuration was during ferry flights between Guadalcanal and Espiritu Santo during the Solomon Islands Campaign. While some aircraft were modified to accept the tanks, no evidence suggests that this configuration was ever used during combat operations.

Later in the production run, Grumman introduced hardpoints and plumbing in the wing stubs that could accept a bomb rack capable of carrying either a bomb or a 58-gallon (220 L) teardrop-shaped drop tank. This modification was also incorporated into the later FM-1 and FM-2 variants.

In the Atlantic theater of operations, the carrier USS WASP (CV-7) was used twice to ferry

### **F4F-4 with 42 Gallon (159 L) Ventral Drop Tank**





During March and April of 1942, USS WASP (CV-7) ferried RAF Supermarine Spitfires on two occasions to the beleaguered British forces on the island of Malta. A Spitfire equipped with a Vokes air filter warms up on WASP's flight deck, while deck hands stand next to a VF-71 or VF-72 F4F-4 (24). The Wildcat's individual aircraft number is painted on the wing upper surface, near the wing fold point. (NMNA)

British Royal Air Force (RAF) Supermarine Spitfires to Malta. In March of 1942, F4F-4s from VF-72 provided top cover while WASP launched the RAF Spitfires. The following month, VF-71 performed the same mission with a second batch of Spitfires launched from WASP. The first major Atlantic engagement involving F4F-4s occurred during Operation TORCH, the invasion of French North Africa on 8 November 1942. Wildcats from VF-9, VF-41, Auxiliary Fighting Squadron Twenty Six (VGF-26), and VGF-29 scored kills against the Vichy French forces during this period.

Operation LEADER in October of 1943 saw VF-4 Wildcats aboard USS RANGER (CV-4) score two kills against Luftwaffe aircraft. This action was an anti-shipping strike at Bødo, Norway and was also supported by the British Home Fleet.

Perhaps the Wildcat's greatest contribution to European Theater operations was its stalwart performance against the German U-Boat (submarine) threat. In order to reduce the tonnage of shipping lost each month to German submarines, starting in early 1943, the Navy began operating anti-submarine escort carriers (CVEs) to accompany Europe-bound convoys. Aboard these 'Jeep' carriers were Composite Squadrons (VCs) featuring a mix of F4F-4s (later FM-1s and FM-2s) and TBF/TBM Avenger torpedo-bombers. While Wildcats were not equipped with Anti-Submarine Warfare (ASW) weapons, they often performed ASW patrols using the pilot's eyes as a sensor. The Wildcats also flew flak (anti-aircraft) suppression while the TBF/TBMs pressed the attack with a variety of weapons, most notably depth charges.

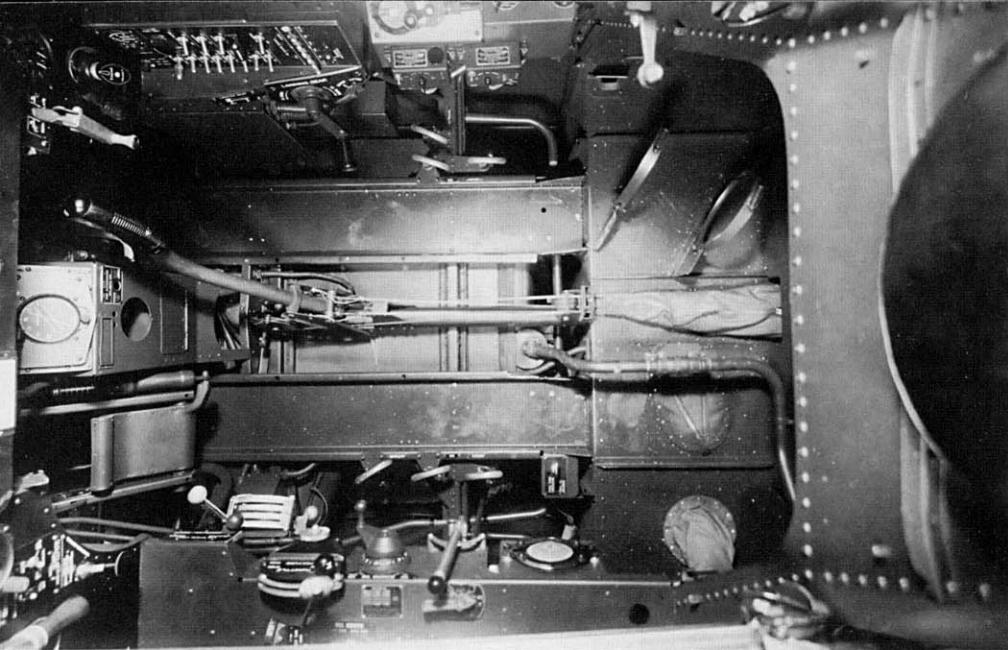
Even as Grumman production of the Wildcat was winding down in 1943, a majority of Wildcats had yet to be built. General Motors produced these aircraft under license under the designations FM-1 and FM-2.



This F4F-4 (F11) aboard USS LONG ISLAND (CVE-1) appears to be in the midst of a catapult shot. The bridle is in place on the catapult track, but the holdback is not. LONG ISLAND's catapult ran diagonally across the flight deck, launching aircraft to port. The gun bays are taped over to keep salt spray out of the gun mechanisms. (NHC)

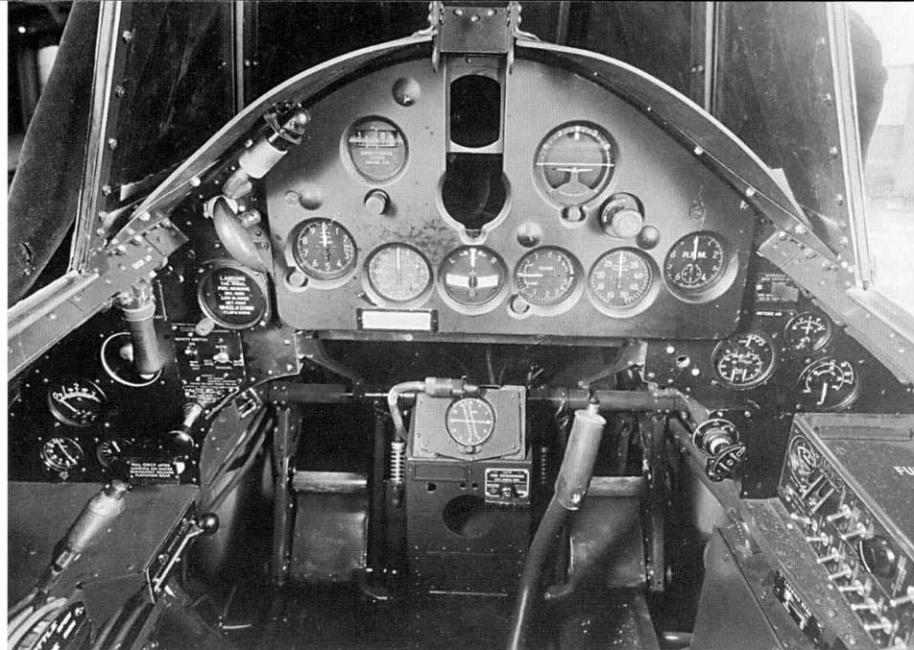
F4F-4s and Grumman TBF Avengers prepare for launch aboard an escort carrier (CVE) in the Atlantic. The aircraft are painted in the standard ASW II scheme of Dark Gull Gray (FS36231) over NS Insignia White (FS37875). The spinner and propeller blade cuffs are also painted Insignia White. Close inspection reveals that each Wildcat has only one 58-gallon drop tank, all on the starboard bomb rack. (NMNA)





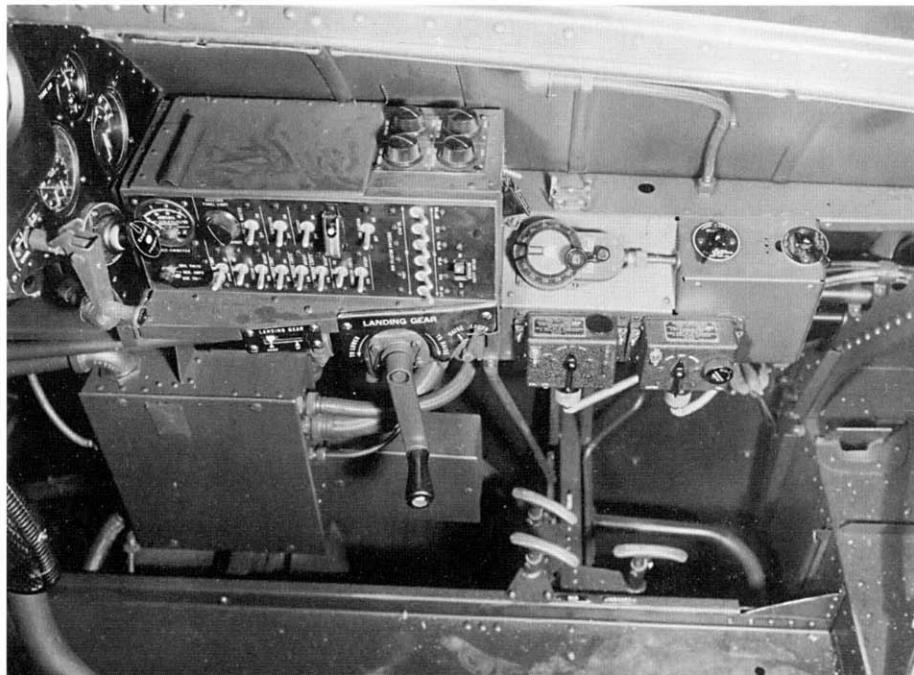
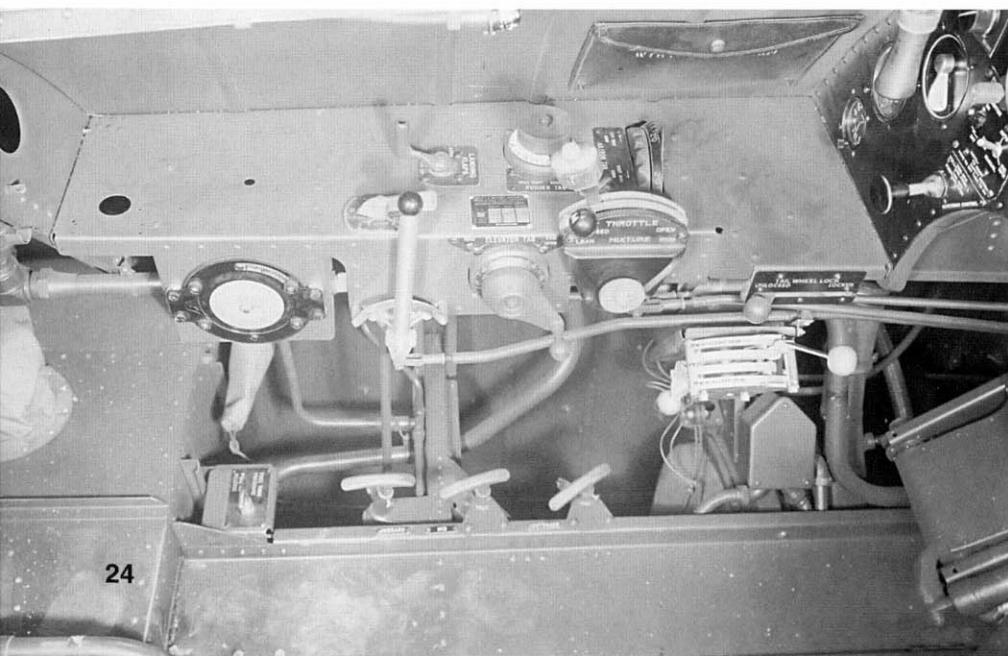
The pilot's seat is removed from this F4F-4 cockpit. The Wildcat did not have a floor, instead having foot troughs for the pilot. The main fuel tank was mounted immediately below the cockpit. The engine primer is to the right of the stick grip. Cockpits were painted Glossy Bronze Green (FS14050) at the factory, but were often repainted differently during overhauls. (Northrop Grumman)

The port cockpit console contained all the trim wheels, throttle assembly, and supercharger control and fuel selector switch. Additionally, the bomb release was located just forward of the throttle quadrant. A document pouch was located on the cockpit sidewall. (Northrop Grumman)



The main and auxiliary instrument panels contained all flight and engine instrumentation. The Wildcat also had a center console, which housed the Remote Magnetic Indicator (RMI). The RMI – also called a directional gyro – was a navigation instrument. (Northrop Grumman)

The starboard console housed all aircraft electrical and oxygen controls. Additionally, the landing gear crank and the position indicator were located on this console. The fuse box was mounted under a hinged panel just forward of the light rheostats. (Northrop Grumman)



This F4F-3 (BuNo 1844) was the first production Wildcat. It and BuNo 1845 were the only two F4F-3s fitted with cowl-mounted machine guns. The Wildcat is painted overall Aluminum, with Glossy Orange-Yellow wing upper surfaces.



F4F-3 (72-F-2, BuNo 1867) wears the colorful pre-war markings of Fighting Squadron Seventy Two (VF-72) aboard USS WASP (CV-7) in early 1941. The tail color is WASP's Black and the First Section color is Insignia Red.



This Martlet Mk II (F) was believed to be assigned to No 805 Squadron operating in North Africa in 1941-1942. Camouflage colors are Middle Stone and Dark Earth over Black.

Lt Cdr John S. Thach, Commander of VF-3, flew this F4F-4 (23, BuNo 5093) from USS YORKTOWN (CV-5) during the Battle of Midway, 4-6 June 1942. VF-3's 'Felix the Cat' insignia is painted under the windshield.



This Martlet Mk V (6-C/JV377) was assigned to No 822 Squadron aboard HMS SEARCHER. Wildcats of this Squadron supported the Allied invasion of Southern France in August of 1944.



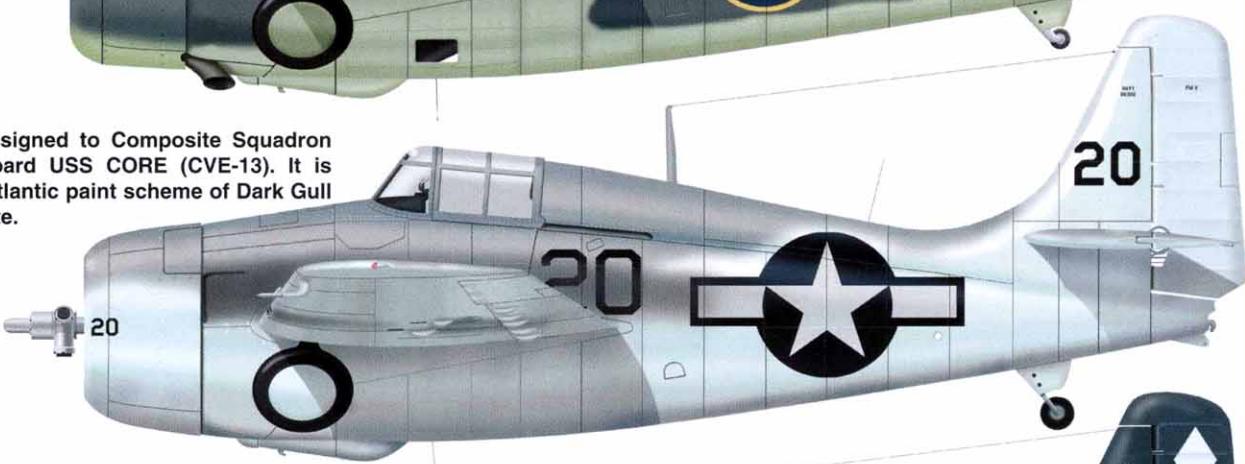
Marine Observation Squadron Two Fifty One (VMO-251) flew this F4F-3P (251MO1) from Espiritu Santo, New Hebrides in late 1942.



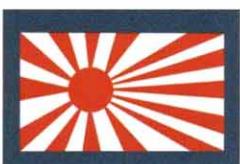
This Martlet Mk IV (Q/FN168) from HMS BITER gained the distinction of shooting down a Junkers Ju 290B on 16 February 1944.



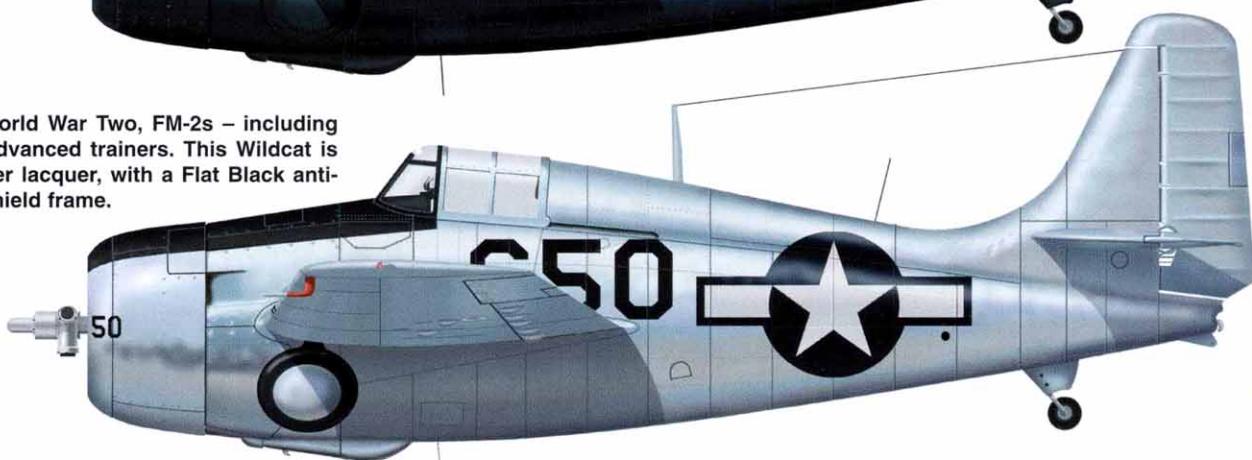
This FM-2 (20) was assigned to Composite Squadron Thirty Six (VC-36) aboard USS CORE (CVE-13). It is painted in the ASW II Atlantic paint scheme of Dark Gull Gray over Insignia White.



This FM-2 (16) was assigned to VC-79 aboard USS SARGENT BAY (CVE-83). The Pacific Fleet escort carrier's two diamond geometric (G) symbol is painted on the rudder, lower left aileron, and upper right aileron.



Towards the end of World War Two, FM-2s – including C50 – were used as advanced trainers. This Wildcat is painted in overall Silver lacquer, with a Flat Black anti-glare panel and windshield frame.



An F4F-4 (41-F-8/BuNo 4084) assigned to Fighting Squadron Forty One (VF-41) flies a patrol from USS RANGER (CV-4) in early 1942. The aircraft has the high-visibility red and white rudder stripes of the early war period. These stripes and the red center of the national insignia were removed from 15 May 1942. VF-41 saw action aboard RANGER during Operation TORCH, the Anglo-American invasion of French North Africa in November of 1942. The aircraft is carrying a practice bomb dispenser under its left wing. (NHC)

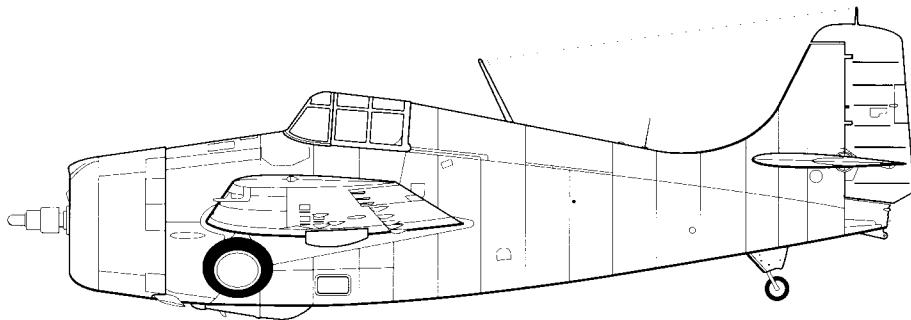
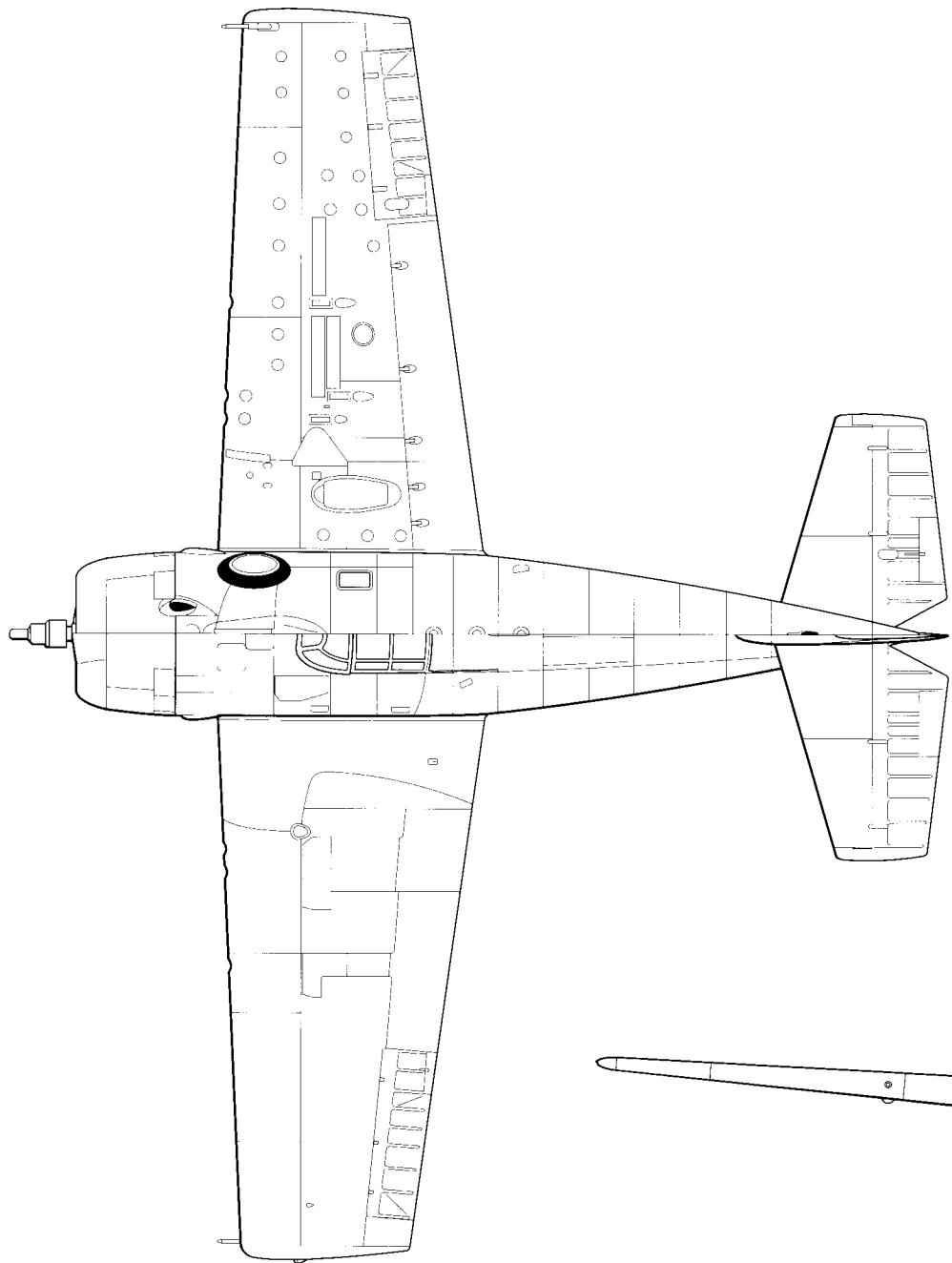


Crewmen aboard USS ENTERPRISE (CV-6) perform maintenance on an F4F-4 (6F8) assigned to VF-6. The carrier was en route to Japan when this photo was taken on 10 April 1942. She escorted USS HORNET (CV-8), which launched 16 US Army B-25B Mitchells from her deck to attack Japan eight days later. A canvas cover is draped over the Red and White rudder stripes. (Tailhook)



Eight F4F-4s share deck space with at least six No 824 Squadron Fairey Swordfish Mk Is aboard USS WASP (CV-7) in May of 1942. WASP was used twice in the spring of 1942 to ferry Spitfires to Malta. The Wildcats retain the early war national insignias, with Insignia Red discs inside the Insignia White stars. (NMNA)





## Grumman F4F-4 Wildcat Specifications

Wingspan:.....38 feet (11.6 M)

Length:.....28 feet 9 inches (8.8 M)

Height:.....11 feet 4 inches (3.5 M)

Empty Weight:.....5776 pounds (2620 KG)

Maximum Weight:..7489 pounds (3397 KG)

Powerplant:.....One 1200 HP Pratt & Whitney R-1830-86 14-cylinder, air-cooled, radial engine

Armament:.....Six .50 caliber (12.7MM) Browning M2 machine guns with 240 rounds per gun in the wings

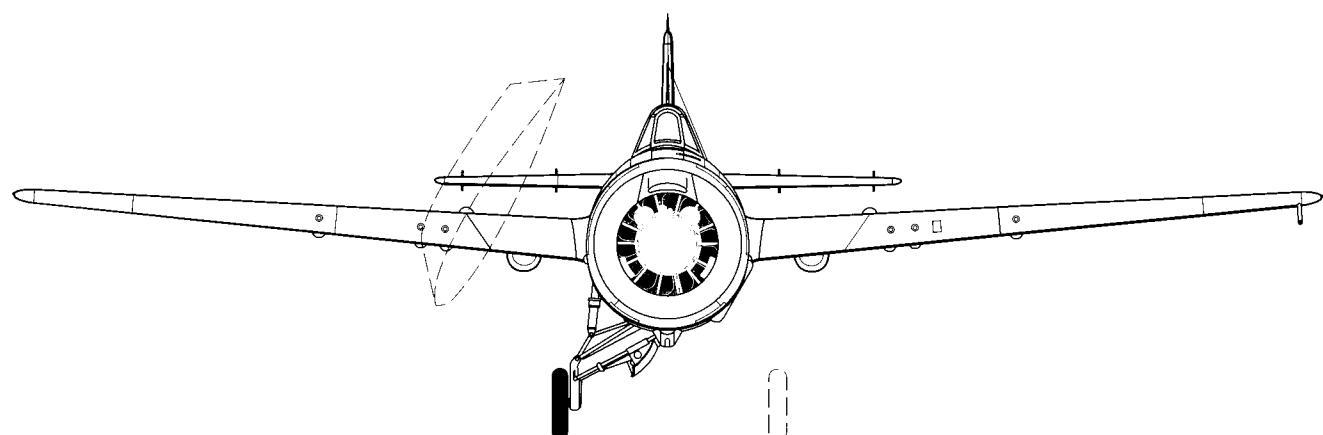
### Performance:

Maximum Speed:318 MPH (512 KMH) at 19,400 feet (5913 M)

Service Ceiling:....33,700 feet (10,272 M)

Range:.....1275 miles (2052 KM)

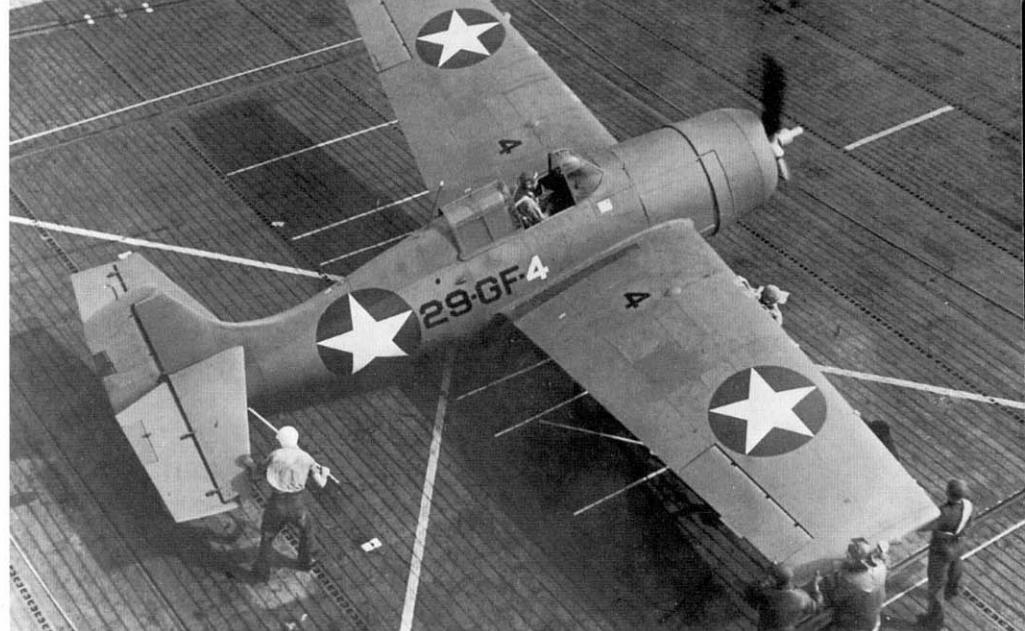
Crew:.....One





A portion of VF-8 prepares to launch their F4F-4s from USS HORNET (CV-8) during the Battle of Midway in June of 1942. HORNET is in a tight turn to port and the landing gear of the Wildcats are reflecting this. The aircraft in the foreground (F14) has a Black 'Spade' outlined in White painted just forward of the windshield. (NMNA)

A Japanese raid damaged this F4F-4 at Henderson Field on Guadalcanal in December of 1942. The landing gear has collapsed. It also appears that some parts may have been scavenged from this aircraft to keep others flying. (Tailhook)



This F4F-4 (29-GF-4) assigned to Auxiliary Fighting Squadron Twenty Nine (VGF-29) taxis on board the escort carrier USS SANTEE (ACV-29; later, CVE-29) in November of 1942. SANTEE and her air group participated in Operation TORCH. Dope on the fabric tail surfaces have faded more than the paint on the metal covered airframe. (Tailhook)

This echelon formation of F4F-4s was from one of the Operational Training Units at Naval Air Station (NAS) Jacksonville, Florida. J on the fuselage code (J1-F-112) designated NAS Jacksonville, while numeral 1 indicated this was the first such unit based at Jacksonville. These Wildcats have the Insignia Red surround of the national insignia authorized for a short time in the fall of 1943. (NMNA)





Grumman's design G-53 utilized an F4F-4 (BuNo 5262) equipped with a non-folding wing and 'duplex flaps.' The inboard flap was of the slotted type, while the outboard flap retracted to fit flush just forward of the aileron. This aircraft was destroyed following an asymmetrical flap deployment that caused the aircraft to go out of control. Test pilot Jimmy Taylor was killed in the crash. (Northrop Grumman)



This F4F-3 takes off from a land base with a Jet Assisted Take-Off (JATO) bottle underneath the fuselage. The take off run was greatly reduced using this method. In March of 1944, further JATO experiments were conducted at sea using an FM-1. (NMNA)

## Wildcat Testbeds

While the Wildcat bore the brunt of early war naval air combat in both the British Fleet Air Arm (FAA) and US Navy, its role as a test aircraft cannot be ignored. Perhaps one of the most unusual tests done with a Wildcat occurred in 1942 when experiments were conducted in which F4Fs were towed by other aircraft. In various experiments, A-20s, TBFs, and B-17s were used as tow planes. The system was designed in such a way that allowed the Wildcat to restart their engines in flight, detach, and recover normally at an airfield or reattach to the towing aircraft. B-17s could tow two Wildcats.

Wildcats were also tested with Jet-Assisted Take-Off (JATO) rockets. Early land-based experiments were conducted using an F4F-3, while later experiments were conducted at sea using an FM-1. No other information on these experiments was found.

One F4F-4 (BuNo 5262) was fitted with 'duplex' flaps. On this aircraft, a non-folding wing was installed and a slotted flap replaced the normal split flap. Additionally, a second flap was installed just forward of the aileron. This flap was flush with the underside of the wing when not deployed. The inboard flaps were operated by the aircraft's pneumatic system, as with production Wildcats, while the outer flaps were electrically actuated. This aircraft received the Grumman design designation G-53. It made its first flight on 5 May 1942; however, the project was terminated when 5262 crashed following an asymmetric deployment of the outboard flaps. Grumman test pilot Jimmy Taylor was killed in the crash.

One F4F-4 was modified with extended wingtips and was known as 'Long Wing.' Photo interpretation estimates approximately three feet (0.9 m) were added to the span of each wing. No further information has been uncovered on this aircraft.

Yet another F4F was modified with 'breakaway' wingtips. Engineers concluded that airframe

weight could be saved if a portion of the wingtip was designed to break off at a prescribed high 'G' (gravity) load. By breaking off, the immense airframe stress on the wings would be reduced, possibly preventing structural failure of the entire wing. The modified F4F-4, with a nominal wingspan reduced by two feet (0.6 m) to 36 feet (11 m), had breakable tips that measured 3.5 feet (1.1 m) each. Following a proper wingtip breakaway, the span was reduced to 29 feet (8.8 m). A portion of the aileron was included as part of the breakaway structure. Flight tests were conducted in 1944 with this F4F-4 and were deemed successful. While never achieving production on the Wildcat, the feature was incorporated into Grumman's F8F Bearcat.

## Wildcat Exports

In rapid succession between November and December of 1939, representatives from Finland, Belgium, and Iran requested quotes on possible purchases of Wildcats.

### Finland

From a letter dated 22 November 1939 to the Finnish Military Air Attaché, Grumman provided two copies of specifications for the Grumman G-36 and a price quotation to a COL Zilliaus of the Finnish Air Force. These aircraft were to be equipped with R-1830-S2C4-G engines capable of operation on 87 octane fuel. No further correspondence has been located.

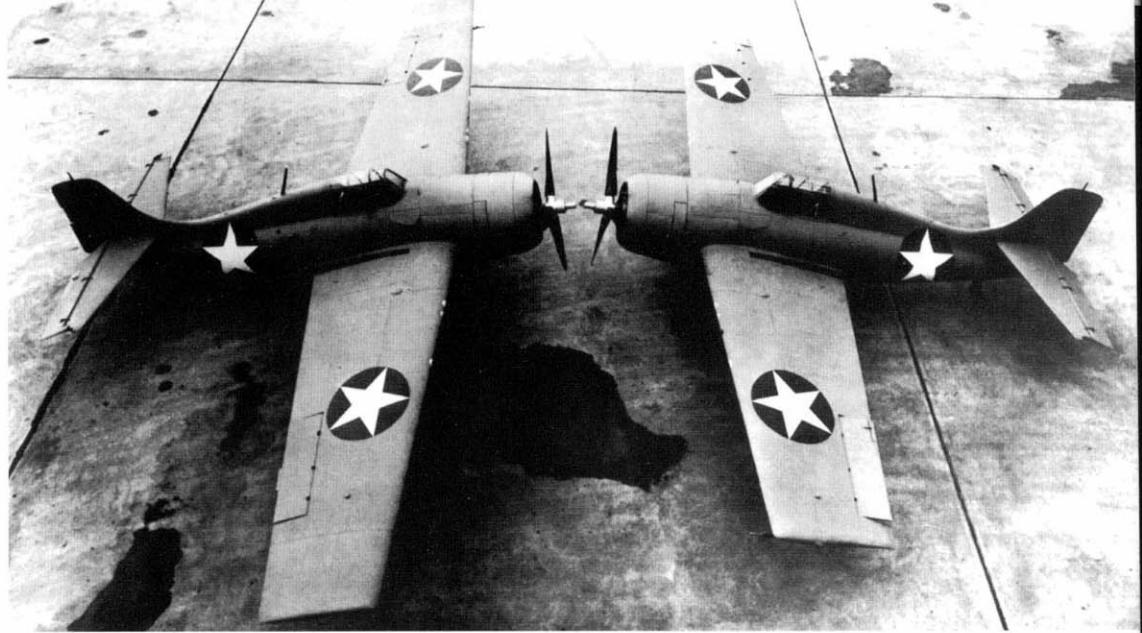
### Belgium

Belgian Air Mission officer MAJ M.L.J. Theis requested a price quotation for production lots of 40, 60, and 80 G-36 aircraft in late November of 1939. These aircraft were to have been powered by a Pratt & Whitney R-1830-SC3-G engine. Prices and delivery schedules were planned, but nothing ever came of the order.

### Iran

Iranian interest in the Wildcat not only included the purchase of 50 aircraft, but also included a request for quotes for the design rights of the aircraft. It also appears there was interest in manufacturing them in Iran for export to other countries of the region. Iranian G-36s were to have been powered by Pratt & Whitney R-1830-SC3-G. In any event, the Imperial Iranian Air Force never purchased Wildcats.

**In 1944, this F4F-4 was used in experiments to test 'breakaway' wingtips. Designed to fail at a prescribed 'G' (gravity) loading, it was determined that the reduced load would prevent a catastrophic wing failure. This feature was included on the Grumman F8F Bearcat, which entered service as World War Two ended in 1945. This F4F-4's nominal 36 foot (11 m) wingspan was reduced to 29 feet (8.8 m) when the tips broke away. (NMNA)**



One F4F-4 (left) was modified with extended wing tips. It is unknown exactly how much greater the span was from the normal Wildcat's 38 feet (11.6 m), but one wonders if there were clearance issues when folding the wings! (NMNA)



## XF4F-8

During 1943, both the F4U Corsair and the F6F Hellcat with their superior performance began finding their way into US Navy and Marine Corps squadrons. Despite this development, there was a need for an aircraft to equip squadrons attached to the escort carriers that began to reach the fleet in large numbers in 1943. To this end, the Navy's Bureau of Aeronautics (BuAer) requested that Grumman build a lightweight variant of the F4F. Grumman's answer to this request was the XF4F-8.

The XF4F-8 was Grumman's effort to decrease the Wildcat's weight and also improve performance. The powerplant chosen for this aircraft was the 1350 hp Wright XR-1820-56 Cyclone with a single-stage, two-speed supercharger. It had an increase of 150 hp over the F4F-4's Pratt & Whitney R-1830-86. Another advantage of this powerplant was the resultant weight savings, since the R-1820-56 had forged cylinder heads in place of the heavier cast units.

Grumman built two XF4F-8s, with the first prototype (BuNo 12228) equipped with an uncuffed Hamilton Standard Hydromatic propeller and slotted flaps. Its armament was six .50 caliber (12.7mm) Browning M2 machine guns – three in each wing. This aircraft initially flew on 8 November 1942. The slotted flaps did not offer any improvement over split flaps and were replaced with standard split flaps. Additionally, the vertical fin and rudder area were increased to counteract the more powerful engine's torque.

The second prototype (BuNo 12229) flew shortly after the first machine. This aircraft incorporated the taller fin and rudder, split flaps, and an uncuffed Curtiss Electric propeller. It retained the two belly windows, but these were deleted on production aircraft. Both XF4F-8s were delivered to the Navy following manufacturer testing at the end of 1942.

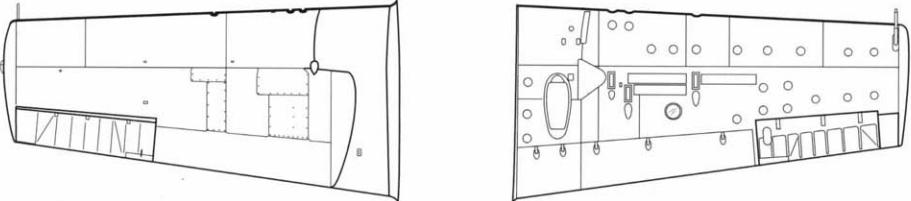
Grumman's emphasis on Hellcat production resulted in the Eastern Aircraft Division of General Motors building the production version of this aircraft, designated the FM-2. Eastern had previously built 839 FM-1s. The Navy signed a contract to purchase 1256 FM-2s early in 1943, with the first aircraft delivered in the fall of the same year.

Removed access panels reveal the powerplant installation of the second XF4F-8 (BuNo 12229). The relocated oil cooler is located at the bottom of the accessory section aft of the engine. The exhaust system is also visible. The additional 150 hp provided by the Wright R-1820-56 necessitated an increase in vertical fin and rudder area. (Northrop Grumman)

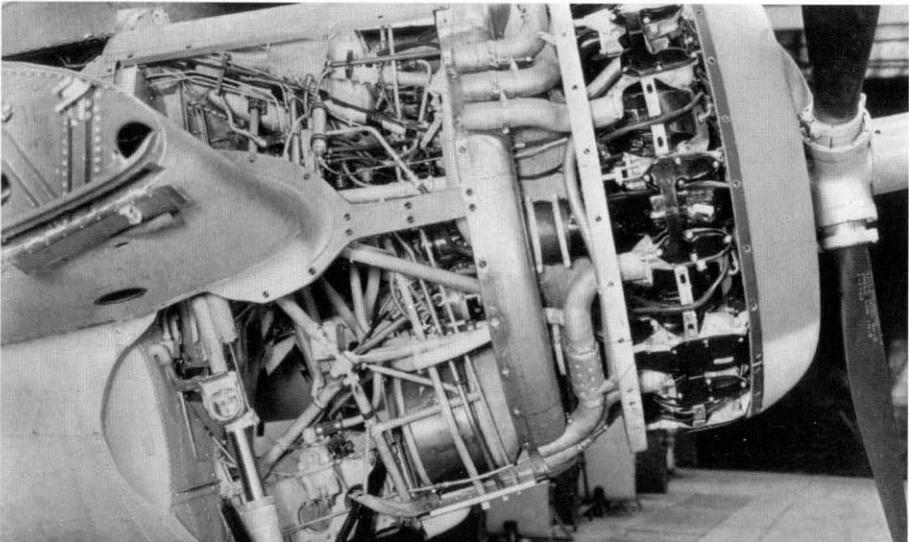
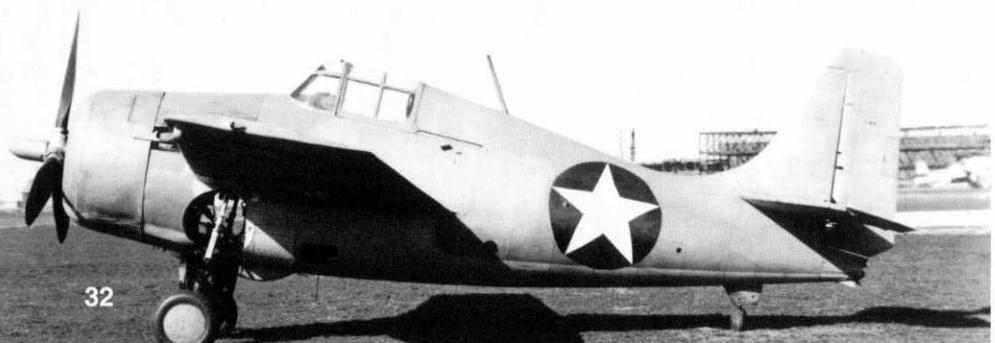


The first XF4F-8 (BuNo 12228) is parked at the Grumman factory. This aircraft was originally fitted with slotted flaps, but this was changed back to the split flap configuration of all previous Wildcat variants. BuNo 12228 is fitted with a Hamilton Standard Hydromatic propeller. (Northrop Grumman)

### XF4F-8 Wing



This XF4F-8 (BuNo 12229) was the second of two prototypes. It featured a taller fin and rudder assembly than previous Wildcats to compensate for the extra 150 hp provided by the 1350 hp Wright R-1820-56 engine. Unlike the production variant, this aircraft retains the belly windows. BuNo 12229 and production FM-2s were equipped with Curtiss Electric propellers. (Tailhook)



# Eastern Aircraft Division FM-1 Wildcat

Grumman decided in early 1942 to eventually cease Wildcat production in favor of the Wildcat's successor, the F6F-3 Hellcat, then under development. In order to keep a constant flow of combat aircraft coming off the line and going to forward areas while Hellcat production ramped up, Grumman decided that another manufacturer would assume all Wildcat and TBF Avenger torpedo bomber production.

Against this backdrop, it must be remembered that the automobile manufacturing giant General Motors (GM) ceased all commercial automobile production when the war began, leaving some manufacturing plants idle. General Motors established the Eastern Aircraft Division, made up of five East Coast GM production facilities. Following negotiations between the Navy, Grumman, and GM in early 1942, the Trenton, New Jersey plant was chosen as the site to build Eastern's version of the TBF, known as the TBM. The Linden, New Jersey plant was chosen as the manufacturing site for the F4F-4 Wildcat, to be known as the **FM-1**. The remaining three production plants supplied parts for production to the Linden and Trenton facilities.

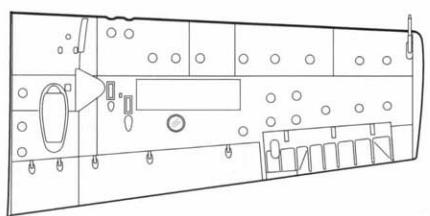
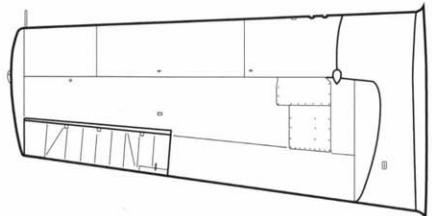
On 18 April 1942, the Eastern Aircraft Division was awarded a production contract for 1800 FM-1 aircraft under license from Grumman. Under this contract, Grumman provided ten shipsets of Wildcat sub-assemblies as pattern aircraft. The first General Motors-assembled Wildcat was flown on 31 August 1942. The first ten aircraft, based on subassemblies from Grumman, incorporated six .50 caliber (12.7MM) Browning M2 machine guns in the wings. This was reduced to four guns on all subsequent FM-1s following complaints from pilots regarding the F4F-4's sluggishness and the reduced firing time of a six-gun armament. Eastern Aircraft delivered 21 FM-1s to the Navy by the beginning of 1943.

FM-1 production accelerated rapidly and Eastern Aircraft completed 839 FM-1s for the US Navy by September of 1943, when production ceased in favor of the newer **FM-2**. An additional 311 FM-1s were accepted by the Royal Navy's Fleet Air Arm (FAA) under Lend-Lease. The British designation for the FM-1 was **Martlet V**; however, in January of 1944, the FAA adopted the name Wildcat for all further deliveries.

FM-1s, like the earlier F4F-4s, were ideally suited for service aboard the US Navy's huge fleet of small escort carriers (CVE). With a folded wingspan of just over 14 feet (4.3 m), the Wildcat took up considerably less space than either F6F Hellcats or Vought F4U Corsairs. FM-1s primarily deployed as part of a Composite Squadron (VC), which typically consisted of TBF/TBMs and F4F/FMs. Numerous VCs were embarked for operations in the Pacific, where they provided close support for amphibious operations. Several VCs were assigned to Atlantic Fleet escort carriers, providing convoy defense and anti-submarine duties.

The FM-1 was powered by a 1200 HP Pratt & Whitney R-1830-86 14-cylinder, air-cooled, radial engine fitted with a two-stage, two-speed supercharger. It had performance similar to that of the F4F-4 on which it was based. The total number of rounds of ammunition increased, as fleet aviators requested, for extended firing time. The four-gun FM-1 had a total capacity of 1720 rounds (430 rounds per gun), compared to 1440 rounds (240 rounds per gun) carried by a six-gun Wildcat. The FM-1 – like the earlier F4F-4 – was plumbed for two 58 US Gallon

## FM-1 Wing Arrangement



This FM-1 is seen at an unknown location in the midst of several Brewster SB2A Buccaneers. The SB2A was an unsuccessful scout/dive-bomber aircraft, which was employed for utility duties at stateside bases during World War Two. This FM-1 was quite possibly a target tug, as there appears to be a towing lug just aft of the tail wheel. (NHC)

Eastern Aircraft FM-1s are on the production line at the Linden, New Jersey assembly plant. General Motors built 1150 FM-1s, with 311 going to the Fleet Air Arm as Martlet Mk Vs. FM-1 production ceased in September of 1943, when it was supplanted on the production line by the FM-2. (NHC)





This FM-1 has FT painted in NS Orange-Yellow (FS33538) on the cowling, denoting this as a Flight Test aircraft. The lower portion of the landing gear assembly is painted Black, which was a common practice on Wildcats. Aircraft in the background include at least two North American SNJs and one Royal Navy Fleet Air Arm Corsair. (Northrop Grumman)

Often misidentified as F4F-4s, these are four FM-1s in echelon formation on a stateside training mission sometime in the fall of 1943. All four aircraft are painted in the three-tone Non-Specular Sea Blue (FS35042) over Intermediate Blue (FS35164) over NS Insignia White (FS37875) paint scheme. The US Navy authorized this scheme for its aircraft on 5 January 1943. The national insignia has Insignia Red borders. (NHC)



(220 L) drop tanks, these being fitted to the non-folding stub wing just outboard of the oil coolers.

All FM-1s fell in two production blocks, BuNos 14992 through 15951 and 46738 through 46837. FM-1s delivered to the FAA under Lend-Lease were initially delivered with BuAer numbers, but were later assigned British serials ranging from JV325 through JV636.

At least one fully restored example of the FM-1 exists, this being the 400th FM-1 (BuNo 15392), owned by the National Air and Space Museum in Washington, DC. The second FM-1 built (BuNo 14994) is owned by the National Museum of Naval Aviation, but its condition is unknown.

An FM-1 (14) assigned to VC-55 has just recovered aboard the escort carrier USS BLOCK ISLAND (CVE-21). The Wildcat has the Atlantic ASW II paint scheme of NS Dark Gull Gray (FS36231) over NS Insignia White. Additionally, it appears that this aircraft has either an Insignia Red border on the national insignia, or has had it painted over with a color not matching the NS Insignia Blue (FS35044) of the rest of the national insignia. (NMNA)



# Eastern Aircraft Division FM-2 Wildcat

Following contract signature in early 1943, Eastern Aircraft began producing a lightweight Wildcat based on the Grumman XF4F-8, called the FM-2. It would eventually supplant the FM-1 on GM's Linden, New Jersey production line. The first of the initial production batch of 1256 FM-2s initially flew in the fall of 1943. By the end of that year, 310 FM-2s had left the production line.

Production FM-2s were powered by a 1350 HP Wright R-1820-56 or -56W (water injection) Cyclone nine-cylinder, air-cooled, radial engine with a single-stage, two speed supercharger. This engine turned a Curtiss Electric uncuffed constant-speed propeller. The powerplant, coupled with an airframe approximately 500 pounds (227 kg) lighter than previous Wildcat versions, made for a potent aircraft. The FM-2 was equipped with shorter chord cowling than Pratt & Whitney-powered aircraft, like on the XF4F-8. The oil cooler was repositioned to the lower portion of the engine accessory section. Armament consisted of four .50 caliber (12.7mm) Browning M2 machine guns, two in each wing. Additionally, the lower fuselage windows were deleted and the openings covered with sheet metal. Finally, the antenna mast located on the fuselage spine was vertically oriented as opposed to the forward-swept mast on previous Wildcat variants.

During the production run, several detail changes were made to the FM-2. A nine-gallon (34 L) increase in fuel capacity to 126 gallons (477 L) was initiated on aircraft 57044, while fittings for five-inch (12.7 cm) zero-length rocket launchers were standard equipment on BuNo 74359 and later FM-2s. These aircraft could carry six rockets. The FM-2 could also carry two 58-gallon (220 L) drop tanks, one under each stub wing.

Production FM-2s reaching the fleet were assigned primarily to escort carrier Composite Squadrons (VCs) in both the Atlantic and Pacific. Atlantic-based FM-2s operated primarily from the escort carriers (CVE) that suited the Wildcat's compact size. These aircraft participated in anti-submarine patrols and convoy escort duties. In the Pacific, FM-2s from escort car-

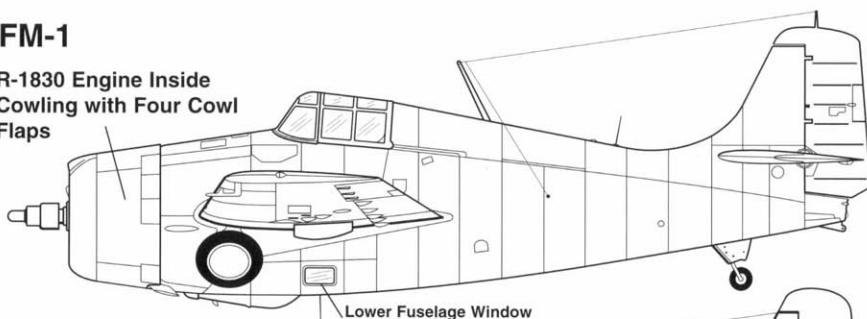


Seemingly endless rows of FM-2s await delivery to the US Navy at the Eastern Aircraft Division's Linden, New Jersey facility. The FM-2 was by far the most numerous of the Wildcat family, with 4437 manufactured for the US Navy and another 340 built for the Royal Navy Fleet Air Arm. (NHC)

An FM-2 taxis at an unknown location under the direction of a Navy Plane Captain on 1 January 1945. It was common to see FM-2 without the wheel covers usually installed on earlier variants. This aircraft is painted in the three-tone scheme of Sea Blue, Intermediate Blue, and Insignia White. (NHC)

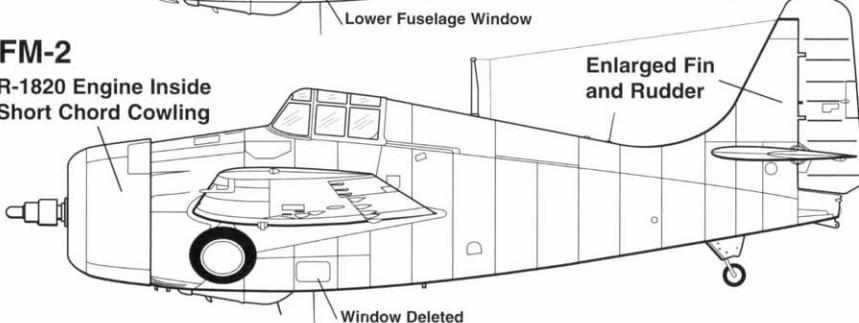
## FM-1

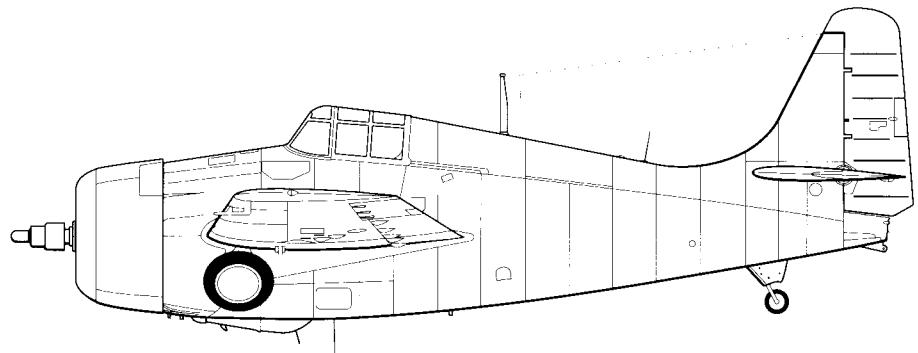
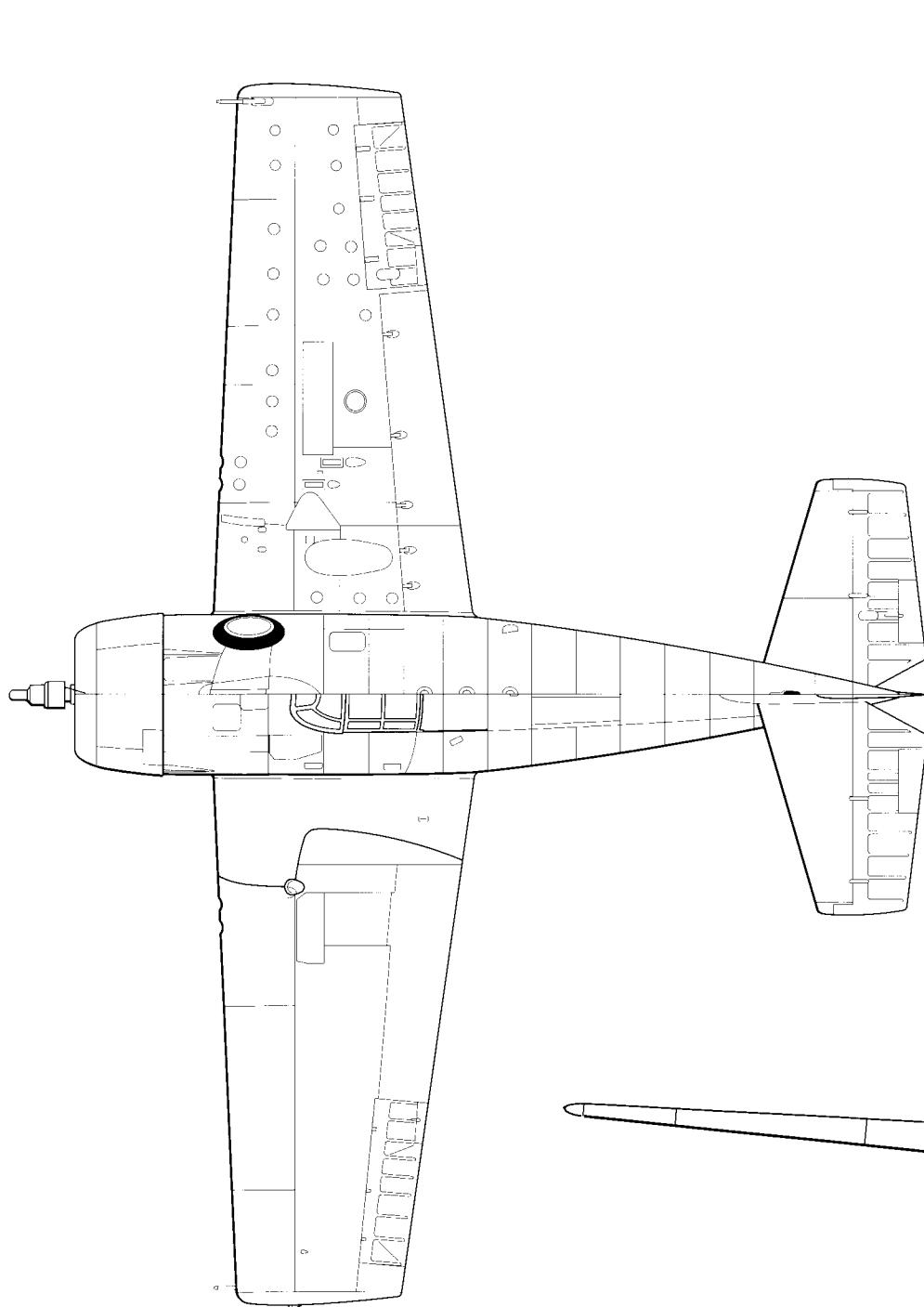
R-1830 Engine Inside Cowling with Four Cowl Flaps



## FM-2

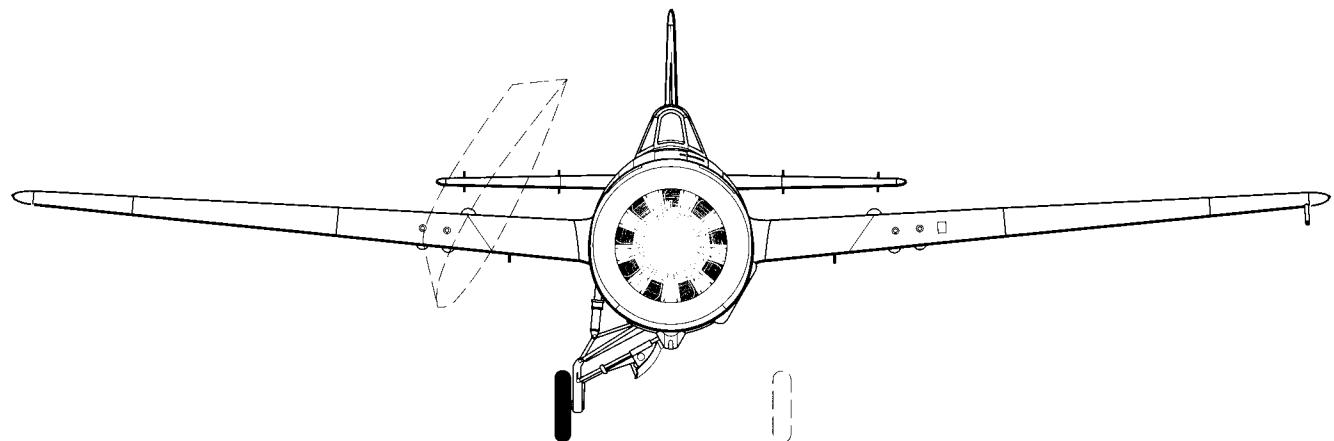
R-1820 Engine Inside Short Chord Cowling





## Eastern Aircraft FM-2 Wildcat Specifications

Wingspan:.....38 feet (11.6 M)  
Length:.....28 feet 11 inches (8.8 M)  
Height:.....11 feet 5 inches (3.5 M)  
Empty Weight:.....5542 pounds (2514 KG)  
Maximum Weight:..7431 pounds (3371 KG)  
Powerplant:.....One 1350 HP Wright R-1820-56 or -56W nine-cylinder, air-cooled, radial engine  
Armament:.....Four .50 caliber (12.7MM) Browning M2 machine guns with 430 rounds per gun in the wings  
Performance:  
Maximum Speed:..320 MPH (515 KMH) at 28,000 feet (8534 M)  
Service Ceiling:....35,600 feet (10,851 M)  
Range:.....1350 miles (2173 KM)  
Crew:.....One





Three FM-2s painted in three-tone camouflage fly in echelon. These aircraft appear to be from the Carrier Aircraft Service Unit (Marine) based at Marine Corps Air Station (MCAS) Ewa, Hawaiian Territory. Each FM-2 carries at least one 58-gallon (220 L) drop tank. (NMNA)

riers flew close air support for Marine landings and also participated in such notable actions as the Battle of Leyte Gulf in October of 1944. Production accelerated rather quickly in 1944, with 2890 FM-2s and 240 Royal Navy Wildcat Mk VIIs being completed. A further 1237 FM-2s and 100 Wildcat Mk VIIs were completed before production was halted in May of 1945. Eastern Aircraft completed 4437 FM-2s and 340 Wildcat Mk VIIs for a total of 4777 aircraft.

Production batches for FM-2s were as follows: BuNos 15952-16791, 46838-47437, 55050-55649, 56684-57083, 73499-75158, and 86297-86973. This list also includes Wildcat VIIs that were renumbered with British serials.

This stateside FM-2 training photo shows an unusual mix of markings. The two closest aircraft have a three-tone paint scheme, while the last two are Glossy Sea Blue. It also appears the third aircraft has an Intermediate Blue rudder. (Dann)



This FM-2 (4) is adorned with carrier identification markings that most closely match those of Composite Squadron Eighty (VC-80) aboard USS MANILA BAY (CVE-61). Its paint scheme is overall Glossy Sea Blue (FS15042), with Glossy Insignia White (FS17875) markings. The 58-gallon drop tank under the port wing is painted White. (NMNA)

FM-2s fought with great distinction through the end of the war, but were quickly phased out of service at the end of hostilities. Some of the last FM-2s served as advanced trainers for newly trained naval aviators.

More than any other Wildcat variant, a number of FM-2s survived World War Two and made their way into the hands of civilian operators. At least one of these was fitted with two seats in the aft fuselage prior to being reconfigured to a more stock configuration. When the warbird movement gained momentum in the late 1970s, more FM-2s could be found in military paint schemes, many being inaccurately painted in early war markings.

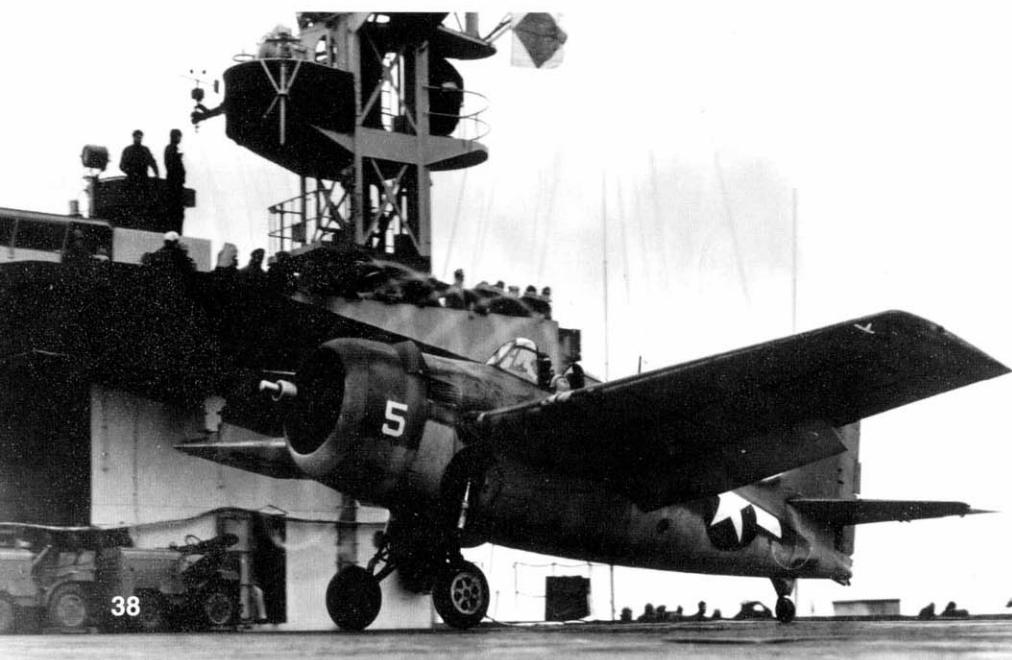
This FM-2 has a 58-gallon drop tank that is Glossy Sea Blue on top and Insignia White on the bottom. Its gun ports are taped over. The fairing covering the tailhook and aft position light is missing from this aircraft, exposing the underlying structure. (SDAM)





This FM-2 (D1/BuNo 55592) was assigned to VC-79 aboard USS SARGENT BAY (CVE-83). The aircraft carries a White 58-gallon drop tank on the starboard bomb rack. The photograph was taken on 7 February 1945. (Tailhook)

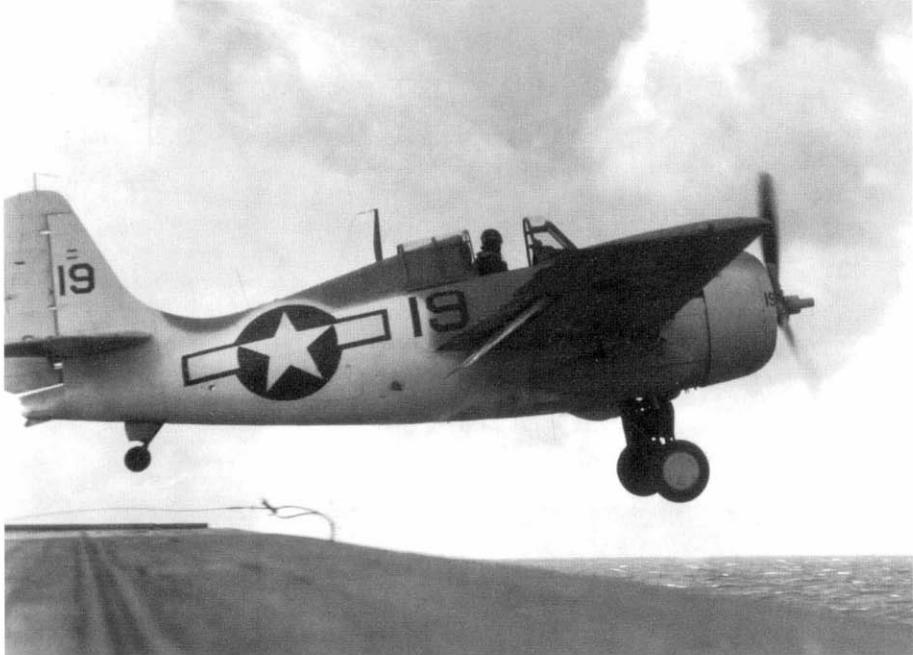
An FM-2 (5) begins its takeoff roll from the deck of USS TAKANIS BAY (CVE-89) during carrier qualifications on 19 March 1945. TAKANIS BAY was assigned to Fleet Air West Coast and carrier qualified 2509 pilots between 24 May 1944 and 28 August 1945. (NHC)



This FM-2 was assigned to the National Advisory Committee of Aeronautics (NACA) Langley Research Center (LaRC) at Hampton, Virginia in early 1945. The aircraft is equipped with six zero-length rocket rails under the wings. Gun ports in the leading edges of the wings appear to be taped over. Two B-24 Liberators are parked in the background of this photo dated 22 January 1945. (NASA LaRC)

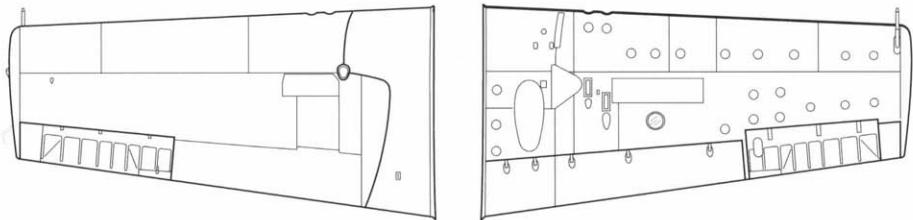
This FM-2 flies stateside on 23 June 1945. It appears the aircraft is nearly factory fresh in the Atlantic ASW II paint scheme of Dark Gull Gray over NS Insignia White. The aircraft lacks wheel covers and has the bullet-shaped propeller dome. A portion of the propeller is painted Insignia White. (NHC)



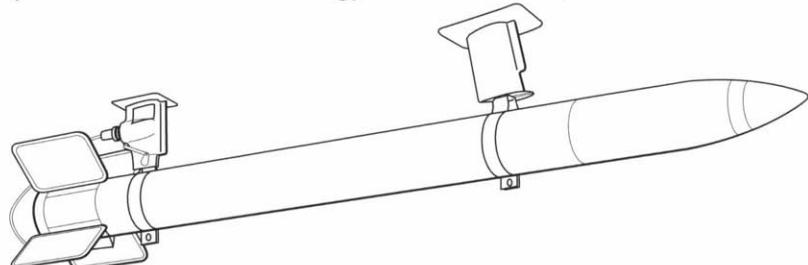


An FM-2 (19) reaches the end of its catapult stroke, flinging the bridle as it departs the carrier. Little exhaust staining is observed on this Atlantic ASW II painted FM-2. A 58-gallon drop tank is mounted under the starboard wing. (NMNA)

### FM-2 Wing Arrangement

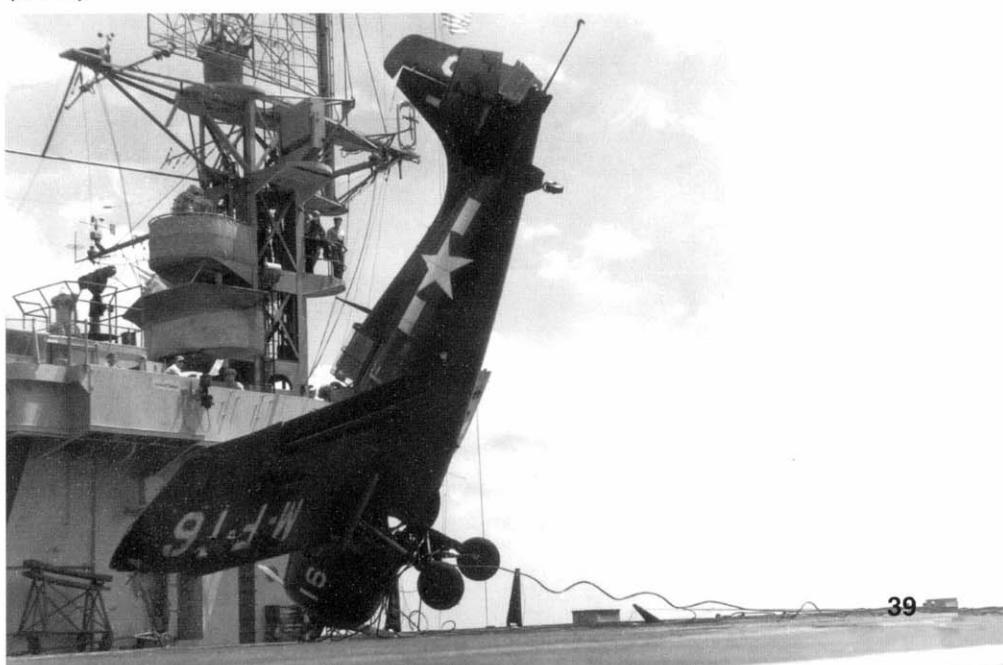


5-Inch (12.7 cm) High Velocity Air Rocket (HVAR)  
(Three Under Each Wing)



This FM-2 has encountered a bit of difficulty while taking a 'trap' aboard USS SOLOMONS (CVE-67). The cable barrier raised across the flight deck stops the Wildcat after the aircraft unsuccessfully engaged the arresting cables. A practice bomb dispenser is located on the port stub wing bomb rack. (NMNA)

An FM-2 (M-F-16) assigned to VC-80 comes nose down aboard USS MANILA BAY (CVE-61). The main landing gear caught an outstretched arresting cable, which tripped up the aircraft. This aircraft lacks the wheel covers commonly seen on previous Wildcat variants. (SDAM)



## G-36A

While war in Europe loomed on the horizon, both Great Britain and France sought to bolster their respective air arms for the coming conflict. Purchasing commissions from both countries approached Grumman to discuss possibly purchasing export variants of the Wildcat.

The French *Aéronautique Navale* (Naval Aviation) was the first to order an export variant of the Wildcat, this being the G-36A. This differed from US Navy Wildcats in having a 1200 hp Wright R-1820-G205A Cyclone nine-cylinder, single-row radial engine with a single-stage, two-speed supercharger. The revised cowling had a shorter chord than Pratt & Whitney-powered Wildcats, although the overall length remained nearly the same. The cowling lacked any cooling flaps. This engine turned a Hamilton Standard Hydromatic propeller.

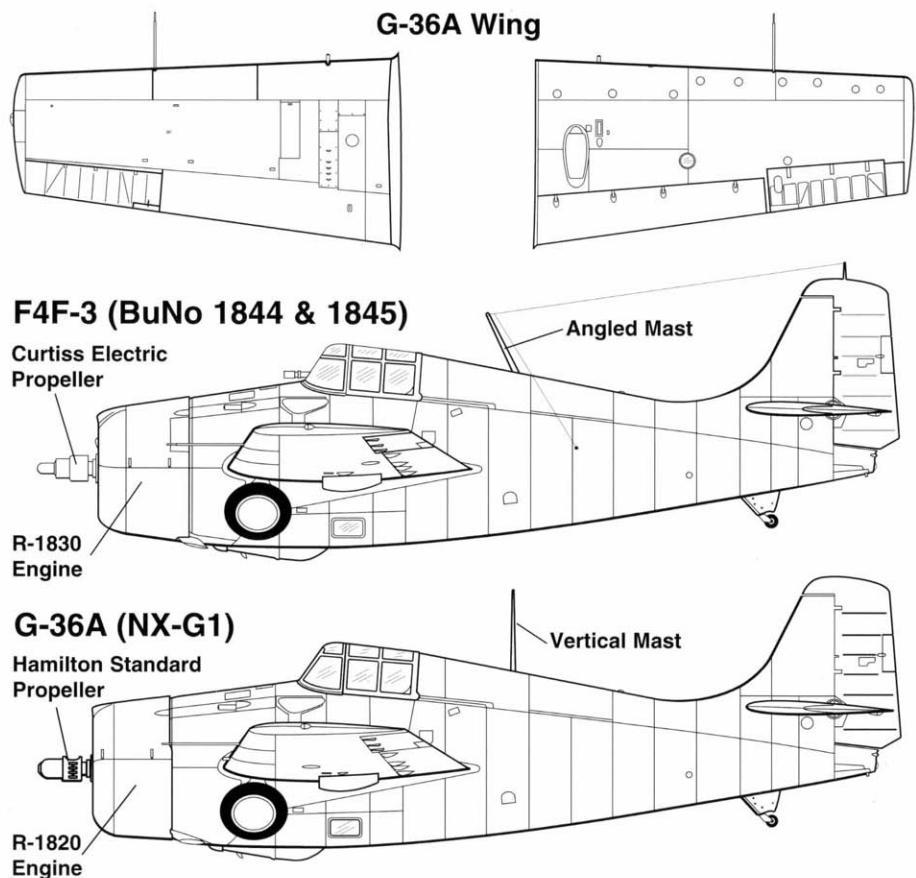
France ordered 81 G-36As and an additional ten aircraft worth of spare parts. It was armed with one 7.5MM Darne machine gun in each wing and two more in the upper fuselage. This was a configuration similar to the first two production F4F-3s. French radios and gun sights were also used. Another noteworthy change to these aircraft was a French throttle assembly that worked opposite to the Grumman installation; pulling aft on the throttle increased power.

The initial aircraft of this order (US civil registration NX-G1) flew for the first time on 10 May 1940 – the same day German troops invaded France. By the time of France's surrender on 22 June 1940, Grumman completed seven G-36As (NX-G1 through NX-G7), although none were delivered to the *Aéronautique Navale*.



The first G-36A (1) for France is parked at Grumman's Bethpage factory. Its planform was similar to that of early F4F-3s, except the G-36A was powered by a nine-cylinder Wright Cyclone engine. A vertical antenna mast is mounted behind the cockpit and there are provisions for cowl-mounted 7.5MM Darne machine guns. (Northrop Grumman)

The first of an intended 91 G-36As for the French *Aéronautique Navale* (Naval Aviation) is displayed prior to its initial flight on 10 May 1940 – the same day German forces invaded France. This overall Light Gray (FS36440) aircraft has red (FS11105), white (FS17875), light blue (FS25090), and black markings. The US civil registration NX-G1 is painted black on the starboard wing's upper surface. (Northrop Grumman)



# Martlet Mk I

With France effectively out of the war in June of 1940, the French and British Purchasing Commissions agreed to allow the United Kingdom (UK) to assume the French Wildcat order. The seven aircraft already manufactured were brought to British standards by replacing the French radio sets, replacing the French throttle, and installing British armament. This consisted of deleting the two cowl-mounted guns and installing four .50 caliber (12.7MM) machine guns: two in each wing. The inboard guns were fitted between Stations 58 and 70 (65 inches/165 CM from aircraft centerline), with the outboard guns between Stations 116 and 126 (121 inches/307 CM from aircraft centerline).

Following the modifications, the G-36As – formally named Martlet Mk I by the Fleet Air Arm (FAA) – were then shipped to Canada for transport to the UK. Only 81 of the Martlet Mk Is managed to reach England; ten were lost when their cargo ship was sunk.

Martlet Mk Is were distributed to FAA units, beginning with a compliment of 12 aircraft assigned to No 804 Squadron at Royal Naval Air Station (RNAS) Hatston in the Orkney Islands from September of 1940. A month later, part of this squadron was detached to form the nucleus of a new No 802 Squadron. On 25 December 1940, two No 804 Sqdn Martlet Mk Is gained the distinction of being the first to shoot down an enemy aircraft in an American-built aircraft in British service. LT L.V. Carter and Sub-LT A. Parker combined to shoot down a Junkers Ju 88 bomber near Scapa Flow in the Orkney Islands north of Scotland.

**Martlet Mk I Wing**

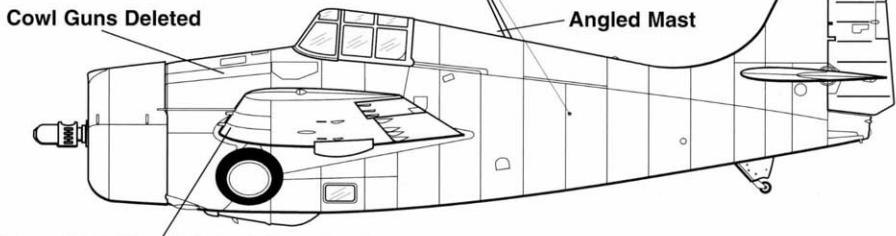


**G-36A (NX-G1)**

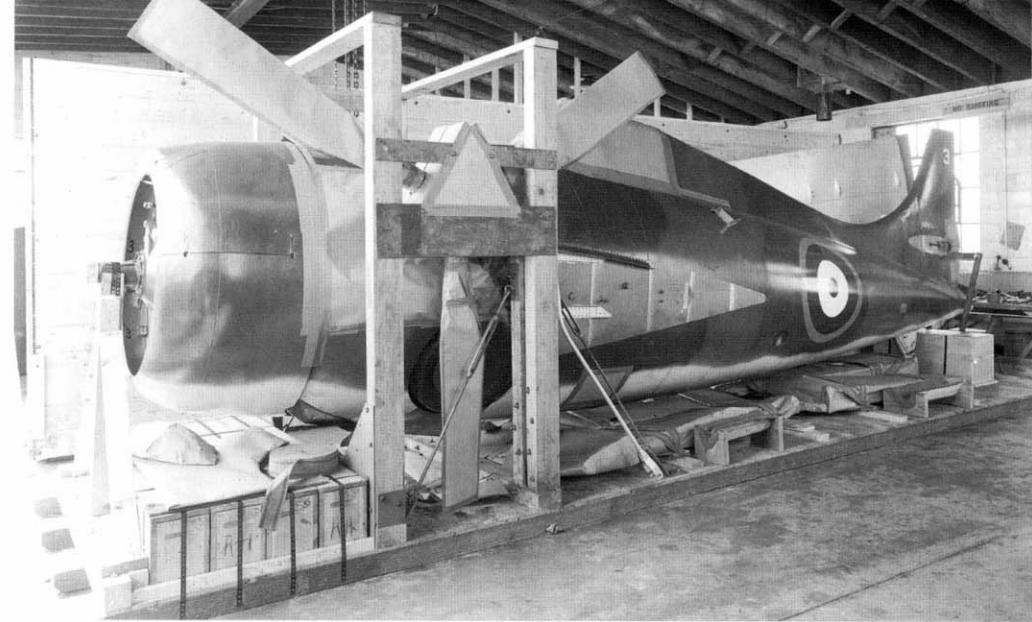


One 7.5MM Gun Per Wing

**Martlet Mk I**



Two .50 Caliber (12.7MM) Guns Per Wing



**A Martlet Mk I is crated for shipment to Great Britain. The wings rest vertically behind the fuselage. Additionally, the tail surfaces are seen under the belly, while the propeller sits next to the forward fuselage. (Northrop Grumman)**

Martlet Mk Is were not considered ideally suited for shipboard operations and never deployed operationally aboard a carrier. Photographic evidence exists that Mk Is did go aboard

**A Martlet Mk I assigned US civil registration number NXG3 makes a test flight prior to shipment to Great Britain. Grumman produced 91 Martlet Mk Is. The aircraft is painted Extra Dark Sea Gray (FS36118) and Dark Slate Gray (FS34096) over Sky (FS34504). Guns have not been installed at this time. (Northrop Grumman)**





A Martlet Mk I (AX828) assigned to No 795 Squadron prepares for a flight sometime in 1942. The demarcation line between top and bottom camouflage colors is highly crisp. This photo has often been misidentified as a Martlet Mk III, but the short-chord cowling and Hamilton Standard propeller leave little doubt that this is a Mk I. (Ray Sturtivant)

While it is recorded in many publications that the Martlet Mk I were only used from land bases, this photo indicates that they did go aboard 'flattops' on occasion. This Mk I, distinguished by its gun configuration, is seen in the nets of an unidentified carrier. The Martlet has a Hamilton Standard propeller and unique exhaust area. (Northrop Grumman)



42



This is the final Martlet Mk I (BJ570) delivered to the Fleet Air Arm. Its paint scheme appears to be Extra Dark Sea Gray and Slate Gray over Sky. The natural metal propeller retains the US Navy tips striping in (from inboard) Insignia Blue, Orange-Yellow, and Insignia Red. (Phil Evans/ADS Decals)

carriers, most likely in the role of deck landing trainers. Nos 802, 804, 805, 806, 880, 881, 882, 888, 893, and 1832 Squadrons operated Martlet Mk Is in various strengths and various times during the 1940-1943 period. Nos 738, 748, 759, 760, 762, 767, 768, 778, 781, 787, and 795 Squadrons also flew Martlet Mk Is. The latter units used them in such roles as deck landing training, service trials, communications, fighter training, advanced training, and service pool aircraft.

The Martlet Mk Is were assigned the following serial numbers: AL236-AL262, AX725-AX738, AX824-AX829, BJ507-BJ527, and BJ554-BJ570. Only one aircraft (AL246) has survived.

This echelon formation of Martlet Mk Is (BJ561 in foreground, A/BJ562 second) displays the markings of No 804 Squadron. BJ562 participated in the destruction of a Ju 88 near Scapa Flow, Orkney Islands on 25 December 1940. (Ray Sturtivant)



# Martlet Mk II/G-36B

In mid-1940, the British Purchasing Commission ordered 100 Grumman G-36Bs under the designation **Martlet Mk II**. While generally satisfied with the performance of its Martlet Mk Is, they were not considered suitable for shipboard use since they were built to French specifications.

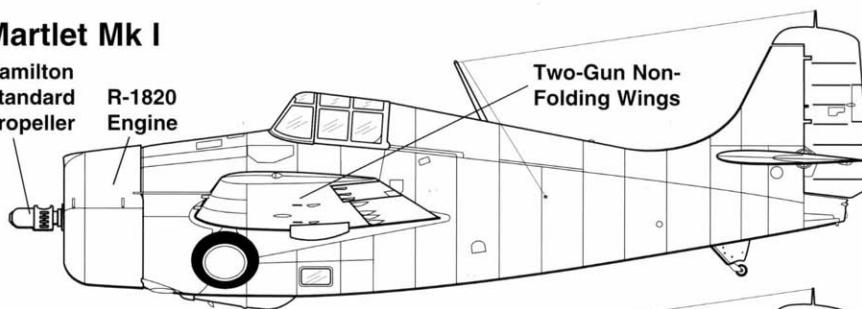
The Martlet Mk II was equipped with a 1200 hp Pratt & Whitney R-1830-S3C4-G, the civilian designation for the R-1830-90 single-stage, two-speed supercharged engine. Its performance was similar to the F4F-3A, which also utilized the R-1830-90.

First flight of the initial Martlet Mk II (AM954) occurred in October of 1940. Grumman retained this aircraft for test purposes. The first nine aircraft (AM955-AM963) were delivered to the FAA in March of 1941. They were manufactured with non-folding wings with two .50 caliber (12.7mm) machine guns per wing. Upon hearing of Grumman's efforts to develop the 'sto-wing,' the British amended their contract with Grumman to deliver the remaining aircraft of the contract with six-gun folding wings and retrofit the first nine aircraft.

An interesting note to the development of the Martlet Mk II was the aircraft's pitot tube. Initially built with a pitot tube identical to that of the F4F-3, this tube was easily damaged during folding. An alternate position was chosen, this being a '7' shaped pitot inboard of the port aileron. Most of the aircraft were later delivered with the 'L' shaped tube seen on F4F-4s and subsequent variants. One Martlet (AM964) was built with two pitot tubes.

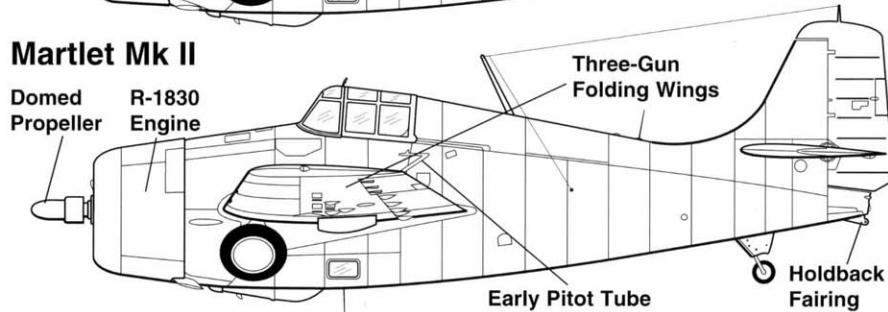
## Martlet Mk I

Hamilton Standard Propeller R-1820 Engine

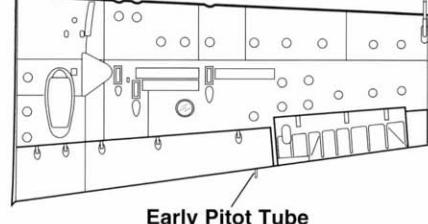
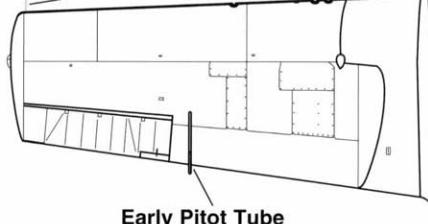


## Martlet Mk II

Domed Propeller R-1830 Engine



## Late Pitot Tube



This Martlet Mk II sits in front of the Bethpage factory minus its military paint job. It is impossible to tell whether this aircraft is equipped with folding wings, but it does have two pitot tubes and could be AM964, the 11th Martlet Mk II built. Grumman manufactured 100 Martlet Mk IIs for the Fleet Air Arm. (Northrop Grumman)

An interesting mix of Martlet Mk IIs at the Grumman factory. From left to right in the front row are: AM968, AM967, AM965, and AM966. From left to right in the rear are NX37174 (US Civil registration) and AM964. NX37174 is equipped with non-folding wings and has its guns faired over. AM964 is equipped with two pitot tubes, with one on the leading edge and the other near the port aileron. (Northrop Grumman)





A number of F4F-3 (left) and Martlet Mk II fuselages (right) are stored in Grumman's Plant Number 2 on 6 December 1941 – the eve of World War Two in the Pacific. The fuselage closest to the camera is AM997. American F4Fs appear to be painted overall Non-Specular Light Gray (FS36440). (Northrop Grumman)

Martlet Mk IIs served with 11 FAA squadrons. These included Deck Landing Training Squadrons (768), Service Trials Units (778), Fleet Fighter Development Units (787), Fleet Fighter Pools (795) and Fighter Squadrons (802, 806, 881, 882, 888, 893, and 1832).

No 802 Squadron equipped with Martlet Mk IIs in July of 1941, with a six-plane detachment going to sea aboard the escort carrier HMS AUDACITY for convoy escort duties to Gibraltar in September. Three Focke Wulf Fw 200 Condors were shot down during this cruise; however, Martlet Mk II (o•7G/AJ127) was also assigned to No 888 Squadron in late 1942. A rear view mirror is mounted on the windshield of this aircraft; this was a common practice for Fleet Air Arm Martlets. All but the first ten Martlet Mk IIs were delivered with folding wings. The spinner appears to be painted Black. Mk IIs could be easily distinguished by the 'bullet' fairing on the propeller hub. (NHC)



This Martlet Mk II (o•7A/AJ148) was assigned to No 888 Squadron and is seen here at La Senia Air Base at Oran, Algeria on 14 December 1942. This Squadron was embarked on the carrier HMS FORMIDABLE and scored two kills during Operation TORCH. No 888 had Martlet Mk IIs on strength between December of 1941 and September of 1943. (NHC)

er, No 802 Squadron Commanding Officer Lt Cdr John Wintour was killed.

A smaller detachment of Martlet Mk IIs went back to sea aboard AUDACITY in December of 1941. Two Fw 200s were claimed during this cruise, one the result of a mid-air collision. AUDACITY was subsequently sunk on 20 December, with five pilots surviving.

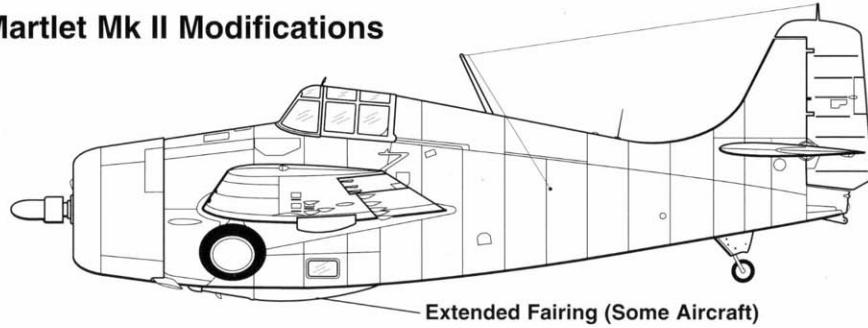
No 806 Squadron received Martlet Mk IIs to equip its 'A' Flight in August of 1942, going to sea aboard HMS INDOMITABLE. During a Malta convoy escort on 20 August, INDOMITABLE was damaged and No 806A was disbanded following the ship's return to England.

No 881 Squadron equipped with Martlet Mk IIs starting in July of 1941. While serving aboard HMS ILLUSTRIOUS in May of 1942, 881 saw action during operations near Madagascar. Later, during operations in support of the capture of Diego Suarez, Madagascar, No 881 shared credit for seven air-to-air kills with No 882 Squadron. No 882 also flew Mk IIs, between April and December of 1942.

No 888 Squadron operated Mk IIs from December of 1941 to September of 1943. This unit participated in Operation TORCH in November of 1942, scoring two kills during the operation. Nos 893 and 1832 Squadrons flew Martlet Mk IIs briefly, but these units' involvement in combat operations cannot be verified.

One Martlet Mk II (AM980) and perhaps other Mk IIs received a modification not often mentioned. An extended ventral fairing was installed on this aircraft, but its purpose is unknown. Additionally, a number of Martlet Mk IIs received additional windshield bracing.

## Martlet Mk II Modifications



# Martlet Mk III

The Martlet Mk III is perhaps the most confusing variant of the Wildcat/Martlet series to track and this author still may not have the entire story straight. It must be remembered that Grumman had been developing a slightly lower performing Wildcat variant equipped with a Pratt & Whitney R-1830-90 single-stage, two-speed supercharged engine. Under the US Navy designation system, this aircraft was known as the F4F-3A.

Italian forces invaded Greece in October of 1940, and an appeal to the United States for assistance soon followed. One response by the US Government was to divert the first 30 F4F-3As to Greece. Construction of the aircraft began shortly thereafter, with the first aircraft coming off the production line on 18 March 1941.

One G-36 (US civil registration NX26874) was the first of these aircraft. It appears that partial Greek markings may have been applied to this aircraft, but it is not certain. All 30 G-36s were ready for shipment by the end of the month. The German invasion of Greece began on 6 April, while the aircraft were en route. They were never delivered to Greece, as the country fell to the Axis powers later that month. The British assumed the shipment and offloaded the aircraft from their cargo ships when they arrived in Gibraltar. These aircraft carried US Navy Bureau Numbers 3875 through 3904 as delivered, and this is where the confusion begins. It is said that these aircraft eventually received British serials BJ501-BJ530; however, there is photographic evidence that shows Martlet Mk IIIs serialled in the AX725 to AX747 range. What adds to the confusion is the fact that some aircraft that are clearly Martlet Mk Is also fall in this range. One publication shows that several Mk IIIs fall in the HKnnn range of serial numbers.

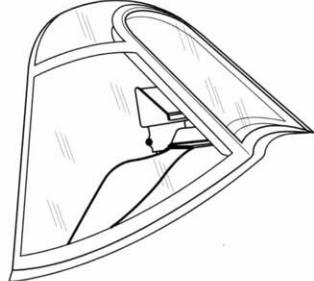
The 30 aircraft serialled BuNo 3875-3904 were identical to F4F-3As as built. They were equipped with non-folding wings and carried two .50 caliber (12.7MM) Browning machine guns in each wing, the same configuration as F4F-3s and F4F-3As. They were powered by 1200 HP Pratt & Whitney R-1830-90 Twin Wasp 12-cylinder radial engines, which turned a cuffed Curtiss Electric propeller. The Martlet III cowling featured a single cowl flap on either side of the cowling and an external lip carburetor intake. Since there was no two-speed supercharger, there was no need for the cheek scoops in the cowling for intercooler air.

These 30 aircraft were assigned to Nos 805 and 806 Squadrons of the Fleet Air Arm. It is believed they were delivered in overall Light Gray (FS36440), with US Navy serial numbers painted on the fuselage, but were repainted with Mid Stone (FS30266) upper surfaces and Azure Blue (FS35231) lower surfaces. Still later, it appears that some aircraft also received a camouflage coat of Dark Earth (FS30118) to compliment these two colors. It is unclear when British serial numbers were allocated to these aircraft.

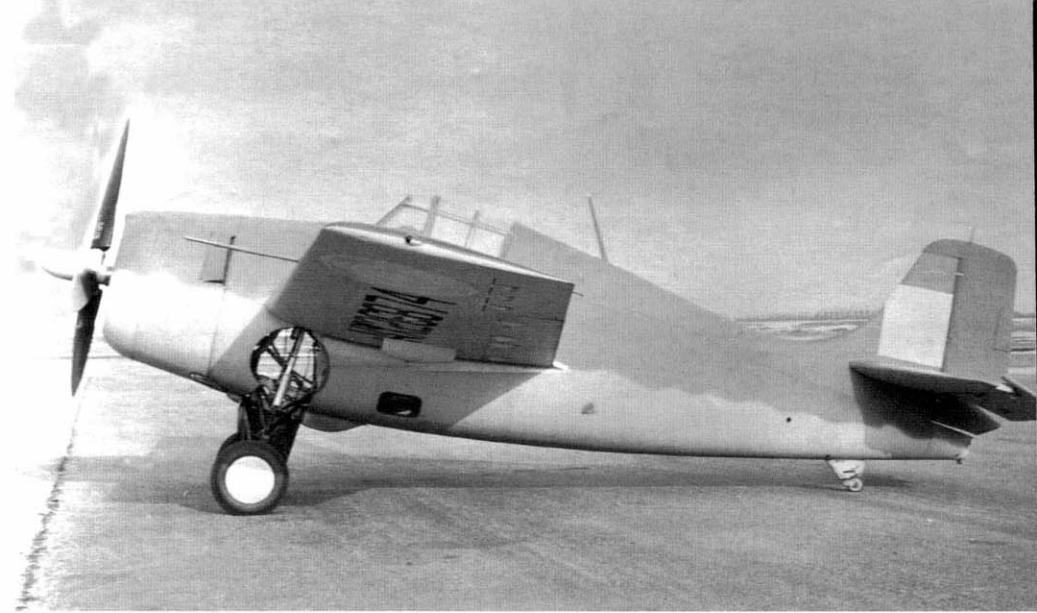
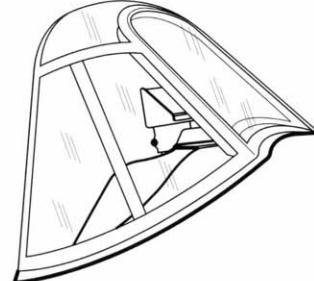
The primary duty of aircraft operating in Egypt's Western Desert was ground attack, convoy escort for ships near the North African coast, and occasional bomber escort missions.

## F4F-3/3A/Martlet I & II Windshield Development

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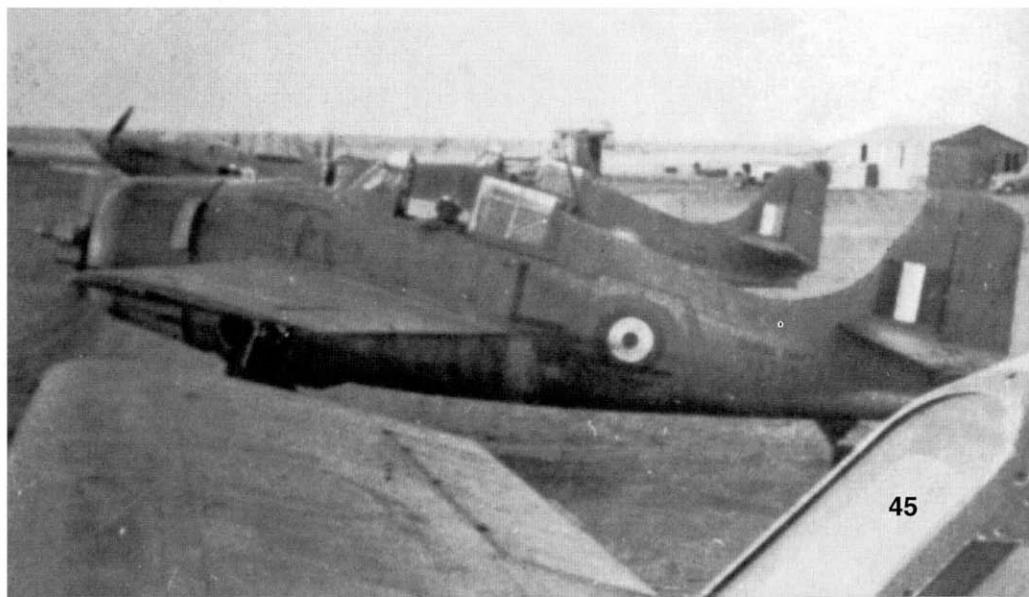
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Grumman G-36 (US civil registration NX26874) is parked at Roosevelt Field, Long Island on 21 March 1941, prior to its shipment to Greece. The Greeks ordered 30 Wildcats (USN BuNos 3875-3904) following an invasion by Italian forces in October of 1940. All were en route when Greece fell to Germany, which had invaded on 6 April 1941. It appears that partial Greek markings may have been applied to this aircraft. Upper surfaces appear to be a medium brown over Light Gray (FS36440). (SDAM)

Several kills were credited to Martlet Mk IIIs, with No 805 Squadron claiming one Italian Fiat G.50 fighter in September of 1941 and at least four bombers in 1942. Later, the Squadron

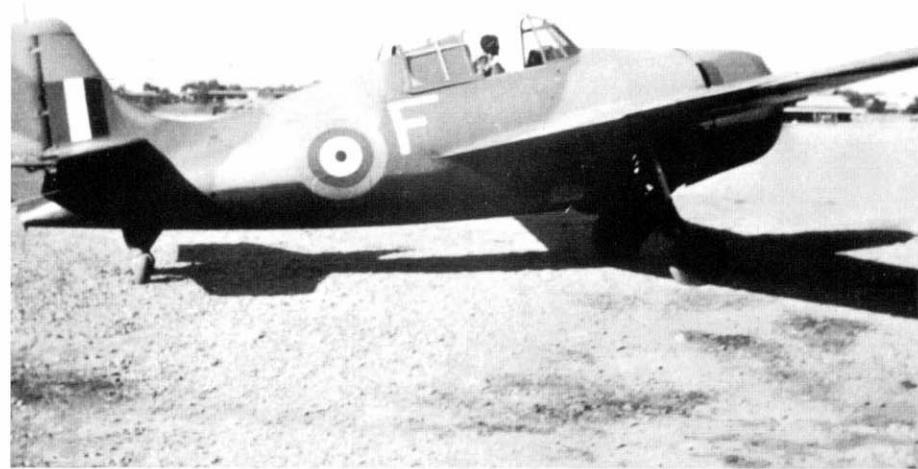
A Martlet Mk III (L/AX734) runs up its engine. Martlet Mk IIIs served primarily with Nos 805 and 806 Squadrons in the Western Desert of Egypt. The Mk III was equivalent to the US Navy's F4F-3A. (Via Glen Phillips)





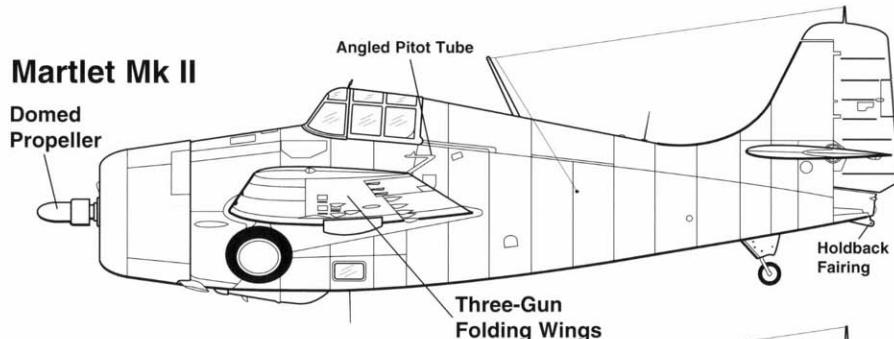
This overall Light Gray Martlet Mk III (K/AX733) of No 805 Squadron prepares to taxi out for take off. The fabric-covered control surfaces on this aircraft have heavily faded, due to constant exposure to the North African sun. The orthochromatic film stock commonly used during this period resulted in the fuselage roundel's yellow ring appearing black in the photograph. (Ray Sturtivant)

This Martlet Mk III (USN BuNo 3876) of No 805 Squadron was the second of the 30 aircraft originally built for the Royal Hellenic (Greek) Air Force. It is believed that this aircraft is painted overall Light Gray. The aircraft sports an inflatable tailwheel instead of the solid rubber type used aboard carriers. (Ray Sturtivant)



This rare photo shows a Martlet Mk III (F) that has received a coat of Dark Earth (FS30118) camouflage over a base coat of Middle Stone (FS30266). Lower surfaces are Black (FS37038). The lightly weathered aircraft is equipped with an inflatable tailwheel for land use and a rear-view mirror atop the windshield. ([www.ww2images.com](http://www.ww2images.com))

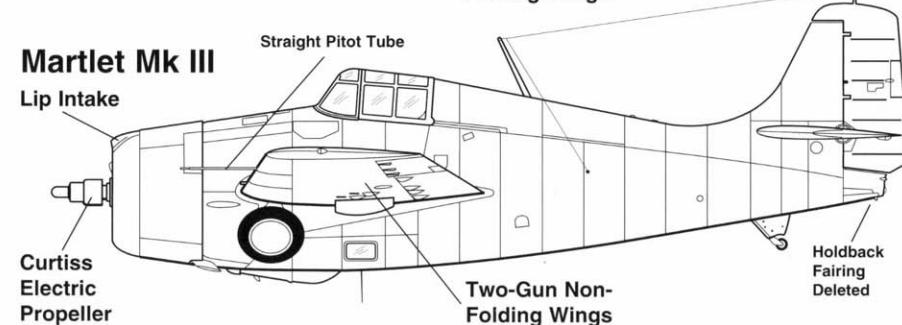
went as far east as Egypt and later found itself in Kenya before returning to the UK and disbanding. No 795 Squadron – a training unit – also flew Martlet Mk III's and apparently operated these aircraft from RAF Station Mackinnon Road, Kenya in the 1942-43 timeframe.



### Martlet Mk II



### Martlet Mk III



# Wildcat Mk IV (F4F-4B)

Under the 1941 Lend-Lease Act, the US Government provided aircraft to both the Royal Air Force (RAF) and Royal Navy Fleet Air Arm (FAA). Among the first aircraft to be exported under Lend-Lease were 220 Wright Cyclone-powered Martlets, known as **Martlet Mk IVs**.

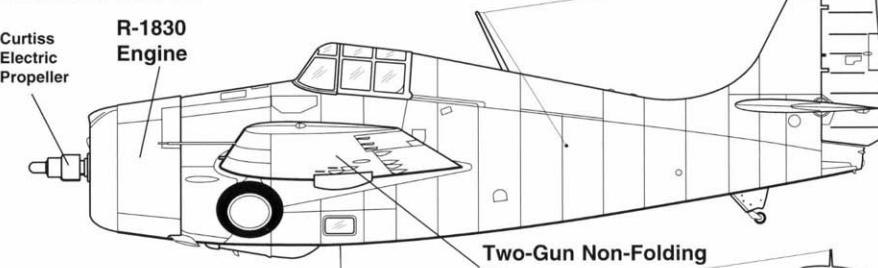
The Martlet Mk IV (also known as the F4F-4B) retained the three-gun folding wings of the F4F-4, but was powered by a 1200 hp Wright R-1820-40B Cyclone with a single-stage, two-speed supercharger. The engine was installed inside a short-chord cowling, which featured two small cowl flaps, one on each side of the aircraft. The propeller installed was a non-cuffed Hamilton Standard Hydromatic, similar to the installation on the Martlet Mk I. The Martlet IV had an overall length of 28 feet 5 inches (8.7 m) and a wingspan of 38 feet (11.6 m). Three .50 caliber (12.7mm) Browning M2 machine guns were installed in the folding outer panel of each wing, in an arrangement like on the F4F-4.

The 220 Martlet Mk IVs were assigned serial numbers FN100 through FN319. Delivery of the first aircraft took place on 27 February 1942, and all 220 were delivered by the end of November. Three Martlet Mk IVs (FN205-FN207) were lost at sea during shipment. The British shipped 17 Martlet Mk IVs to Mombasa, Kenya, while all others were sent to England for further disposition.

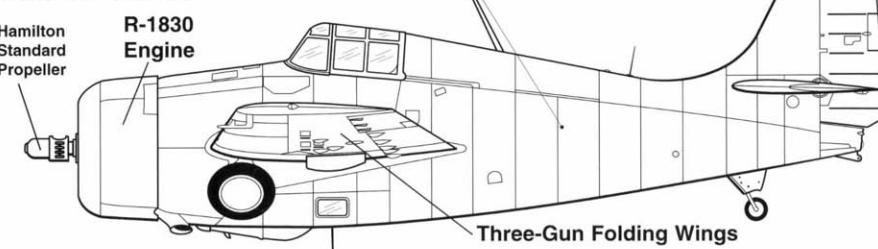
The first unit to receive Martlet Mk IVs was No 892 Squadron, which took six on strength at NAS Norfolk, Virginia in July of 1942. After transport back to England, 892 undertook convoy escort duties from the escort carrier HMS ARCHER beginning in 1943. Martlet Mk IVs served in 26 different FAA squadrons in all major theaters during World War Two.

The first operation where Mk IVs played a major role was Operation TORCH, the invasion of French North Africa in November of 1942. During TORCH, No 882 (HMS VICTORIOUS) and No 893 Squadrons (HMS FORMIDABLE) flew Martlets IVs, with 882 claiming several kills against Vichy French and German aircraft. One No 882 Squadron pilot even managed to 'capture' an airfield near Algiers, Algeria. Both 882 and 893 Squadrons claimed the unusual distinction of having their Mk IVs repainted with US national insignias, with the belief being that Vichy forces were more likely to surrender to the Americans than to the British.

## Martlet Mk III



## Martlet Mk IV



This Martlet Mk IV (09-L/FN146) belonged to No 893 Squadron aboard HMS FORMIDABLE and is seen here at La Senia Aerodrome in Oran, Algeria on 5 January 1943. The aircraft has suffered some propeller and cowling damage and is being serviced. The FAA code for 893 Sqdn was 09. Surrounding this Martlet are (from left) a P-38 Lightning, a C-47 Skytrain, and a Fairey Albacore. (NMNA)

Following TORCH, Martlet Mk IVs participated in other notable operations, including Sicily, Salerno and the invasion of Southern France in August of 1944. Besides these operations, Martlet Mk IVs also participated in Atlantic and Mediterranean convoy escorts and anti-submarine patrols.

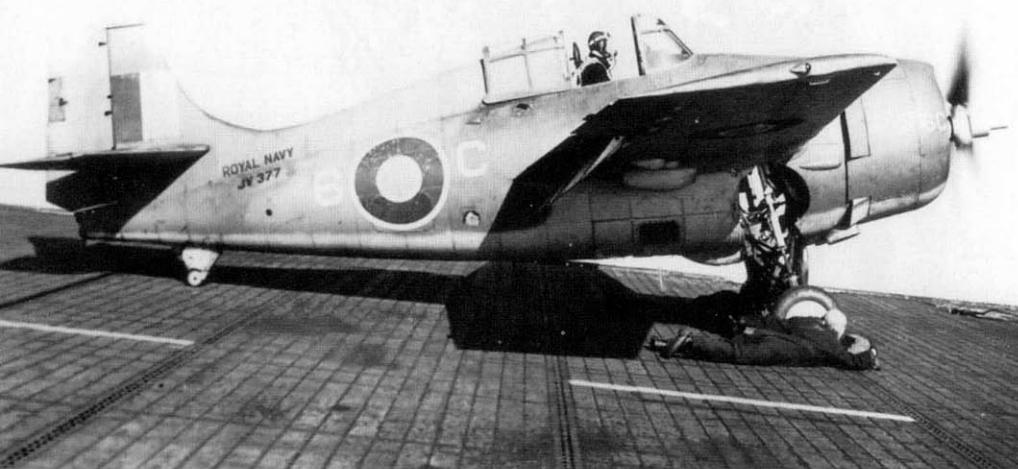
What is not commonly known is Martlet Mk IV's use in the Pacific. FAA Martlet Mk IVs participated in the invasion of Madagascar in 1942, and at least three squadrons supported American operations in the Coral Sea and Middle Solomon Islands in concert with the carrier USS SARATOGA (CV-3) between May and July of 1943.

Only one air-to-air victory against the Japanese is credited to an FAA Martlet. A No 888 Squadron Martlet Mk IV shot down a Kawanishi H6K (Allied code name Mavis) flying boat while operating over the Bay of Bengal in July of 1942.

The first of 220 Martlet Mk IVs (FN100) is displayed at NAS Anacostia, District of Columbia on 21 April 1942. The Mk IV featured a Wright R-1820-40B nine-cylinder engine and a Hamilton Standard Hydromatic propeller. Martlet Mk IVs were heavily involved with Operation TORCH during late 1942. (NHC)

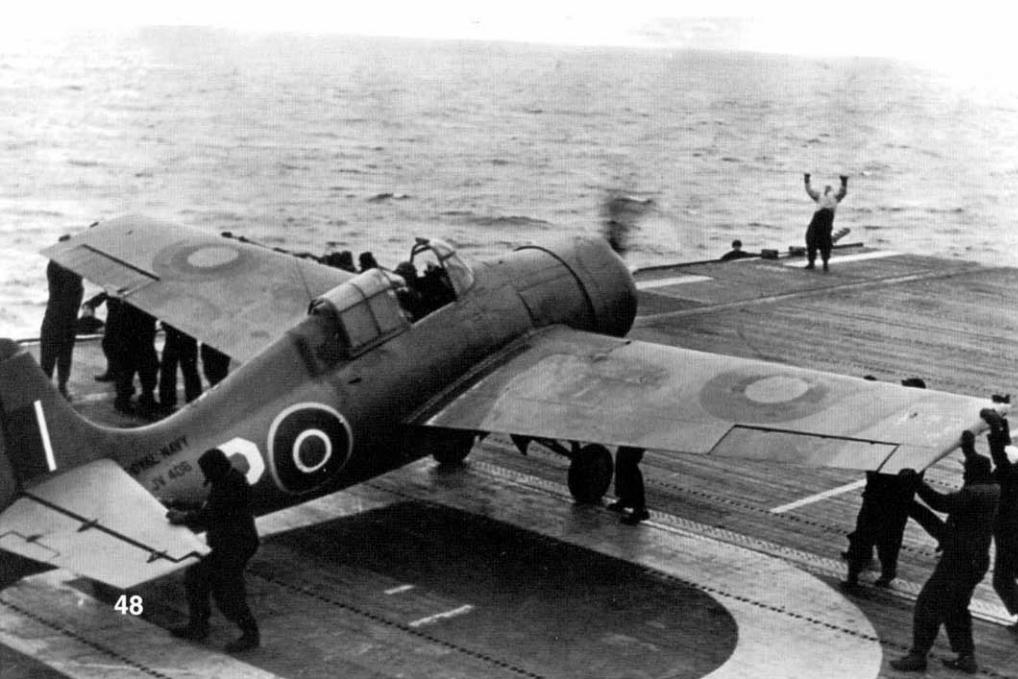


# Wildcat Mk V



A Wildcat Mk V (6-C/JV377) assigned to No 882 Squadron prepares to launch from the deck of the escort carrier HMS SEARCHER in 1944. A deck crewman lies by the starboard main landing gear preparing to pull the wheel chock, while a colleague is beside the port gear. (Ray Sturtivant)

Deck crewman steady a No 881 Squadron Wildcat Mk V (JV406) prior to launch from HMS PURSUER sometime in April of 1944. The fighter is camouflaged in Extra Dark Sea Gray and Dark Slate Gray over Sky Type S. (Ray Sturtivant)



Following the transfer of Wildcat production from Grumman facilities to General Motors' Eastern Aircraft Division, the US Navy ordered 1800 FM-1s for service on escort and light carriers in both the Atlantic and Pacific theaters of war. Only 839 of these were delivered to the US Navy before production shifted to the FM-2 and an additional 311 FM-1s were delivered to the Royal Navy Fleet Air Arm under the Lend-Lease Act.

The Martlet Mk V (renamed Wildcat Mk V in January of 1944) was essentially identical to the US Navy's FM-1, and retained the four-gun armament of its American counterpart. Additionally, the same 1200 hp Pratt & Whitney R-1830-86 radial engine with a two-stage, two-speed supercharger and cowling configuration was retained.

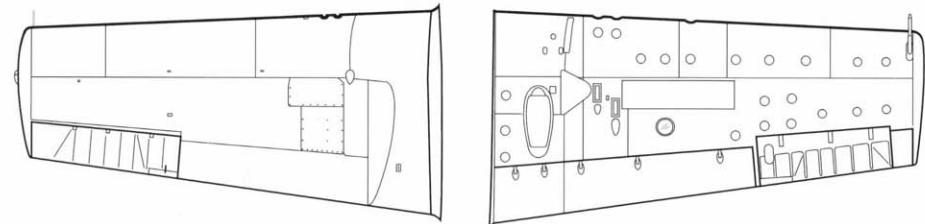
Two Wildcat Mk Vs were completed in 1942, with an additional 309 being completed in 1943 before production switched over to the FM-2/Wildcat VI. These aircraft were allocated British serial numbers JV325 through JV636. Wildcat Mk Vs began to appear in numbers in the Fall of 1943, but combat action in the type did not take place until February of 1944. Several Wildcat Mk Vs were assigned to No 881 Squadron aboard the escort carrier HMS PURSUER, which was providing convoy escort services. This Squadron's Wildcats shot down one Heinkel He 177 and one Focke-Wulf Fw 200 during the evening of 12 February 1944.

During Operation TUNGSTEN in April of 1944, Wildcat Mk Vs were embarked in several of the carriers in the strike group sent to sink the German battleship TIRPITZ. One of the squadrons involved was No 881, which was still embarked on PURSUER. The next major engagement that saw the Wildcat Mk V in action was Operation ANVIL-DRAGOON, the invasion of Southern France in August of 1944.

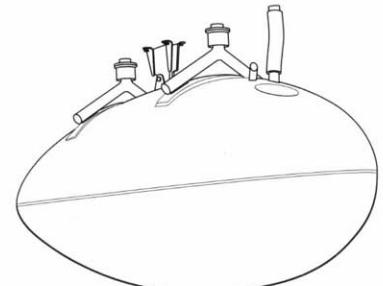
Throughout their service, Wildcat Mk Vs were embarked on the Royal Navy's fleet of escort carriers, participating in anti-submarine warfare, convoy escort, and fighter sweeps of coastal installations. Wildcat Mk Vs also saw service in the Far East. No 834 Squadron maintained a shore-based detachment of six aircraft in India for a time.

The Wildcat Mk V equipped 36 FAA squadrons – more squadrons than any other Martlet/Wildcat variant. Many Wildcat Mk Vs made a good accounting of themselves in combat, while others were relegated to training and support roles.

## Wildcat Mk V Wing Arrangement



## 58 Gallon (220 L) Drop Tank



# Wildcat Mk VI

The final Wildcat variant to see FAA service was the equivalent of the US Navy's FM-2, which was known to the British as the Wildcat Mk VI. Identical to the US Navy's version, 340 Wildcat Mk VIs were delivered to the FAA under Lend-Lease agreements. This included 220 sent in 1944 and the final 120 aircraft delivered in 1945.

The Wildcat Mk VI was powered with a 1350 hp Wright R-1820-56 or -56W nine-cylinder, air-cooled, radial engine. It was armed with four .50 caliber (12.7mm) Browning M2 machine guns located in the folding outer wing panels. A 58-gallon (220 L) drop tank or 250 pound (113 kg) bomb could be carried under each stub wing.

Initial Wildcat Mk VI deliveries went to No 881 Squadron, which participated in the invasion of Southern France in August of 1944 while serving aboard HMS PURSUER. No 881 also saw action off the coast of Norway prior to re-equipping with Grumman Hellcat Mk IIs in March of 1945.

Like its previous Martlet/Wildcat variants in FAA service, the Wildcat Mk VI saw service in both the Atlantic and Pacific theaters of operation. In the Atlantic and Mediterranean, Wildcat Mk VIs were used to escort convoys, which included several runs to Russia. Mk VIs were also active in anti-submarine operations in the Atlantic. No 882 Squadron Wildcat Mk VIs participated in a strike against U-boat pens at Kilbotn, Norway.

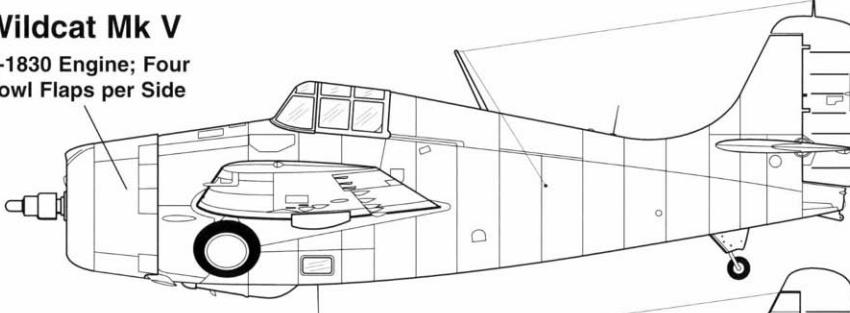
In the last weeks of the European War in 1945, Wildcat Mk VIs of HMS SEARCHER's No 882 Squadron engaged in air-to-air combat with German fighters. On 26 March, eight Messerschmitt Bf 109G fighters attacked a flight of Avengers and Wildcats off the Norwegian Coast. Wildcats claimed four Bf 109s in the ensuing dogfight.

Wildcat Mk VIs also saw action in the Far East. The much-traveled No 881 Squadron aboard HMS PURSUER and No 882 Squadron aboard HMS SEARCHER deployed with the British East India Fleet, but the war ended prior to either squadron seeing action. Both ships returned to Britain in October of 1945 and these Squadrons were disbanded the same month.

Wildcat Mk VIs served in 22 FAA squadrons during World War Two. These units included Nos 700, 722, 748, 757, 771, 787, 794, 811, 813, 815, 819, 821, 825, 835, 838, 846, 850, 852, 853, 856, 881, and 882 Squadrons. Other Wildcat Mk VIs were assigned to non-combat

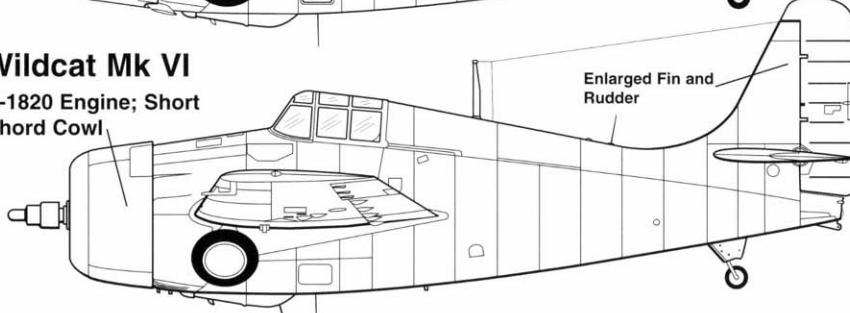
## Wildcat Mk V

R-1830 Engine; Four Cowl Flaps per Side



## Wildcat Mk VI

R-1820 Engine; Short Chord Cowl



A Wildcat VI (S•B/JV716) of No 882 Squadron recovers aboard HMS SEARCHER sometime in 1945. This aircraft is painted Extra Dark Sea Gray and Dark Slate Gray over Sky. There appears to be significant damage to the tail surfaces, as most of the right horizontal stabilizer is gone and the rudder also has damage. (Ray Sturtivant)

squadrons, carrying out such varied missions as test pilot training, establishing fleet requirements, aerial gunnery, fleet fighter development, and target towing. The FAA quickly phased out all Martlet/Wildcat aircraft following the end of World War Two, when all countries quickly disarmed.

Great Britain was the only foreign country to operate Martlets/Wildcats in action. They became operational at a time when a good naval fighter aircraft was desperately needed at sea, and the Wildcats made a good accounting of themselves, up until the end of the war.

This overall Glossy Sea Blue (FS15042) Wildcat Mk VI (J3•V/JV851) belonging to No 794 Squadron sustained a landing gear collapse at Royal Naval Air Station (RNAS) Eglinton, Northern Ireland. It is equipped with a rear-view mirror, which was common on most Fleet Air Arm Wildcat/Martlets. The aircraft also appears to have either a practice bomb dispenser or a target towing gear attached to the left underwing bomb rack. (Ray Sturtivant)





(Above) One of the original batch of Martlet Mk I fighters delivered to the Fleet Air Arm was this fighter (AL257). It was assigned to No 804 Squadron at Royal Naval Air Station Hatston, Orkney Islands in late 1940.

(Below) White 18 was an FM-2 assigned to VC-99 aboard USS HOGGATT BAY (CVE-75) in July of 1945. This escort carrier operated in the Pacific during the last weeks of the war against Japan.



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